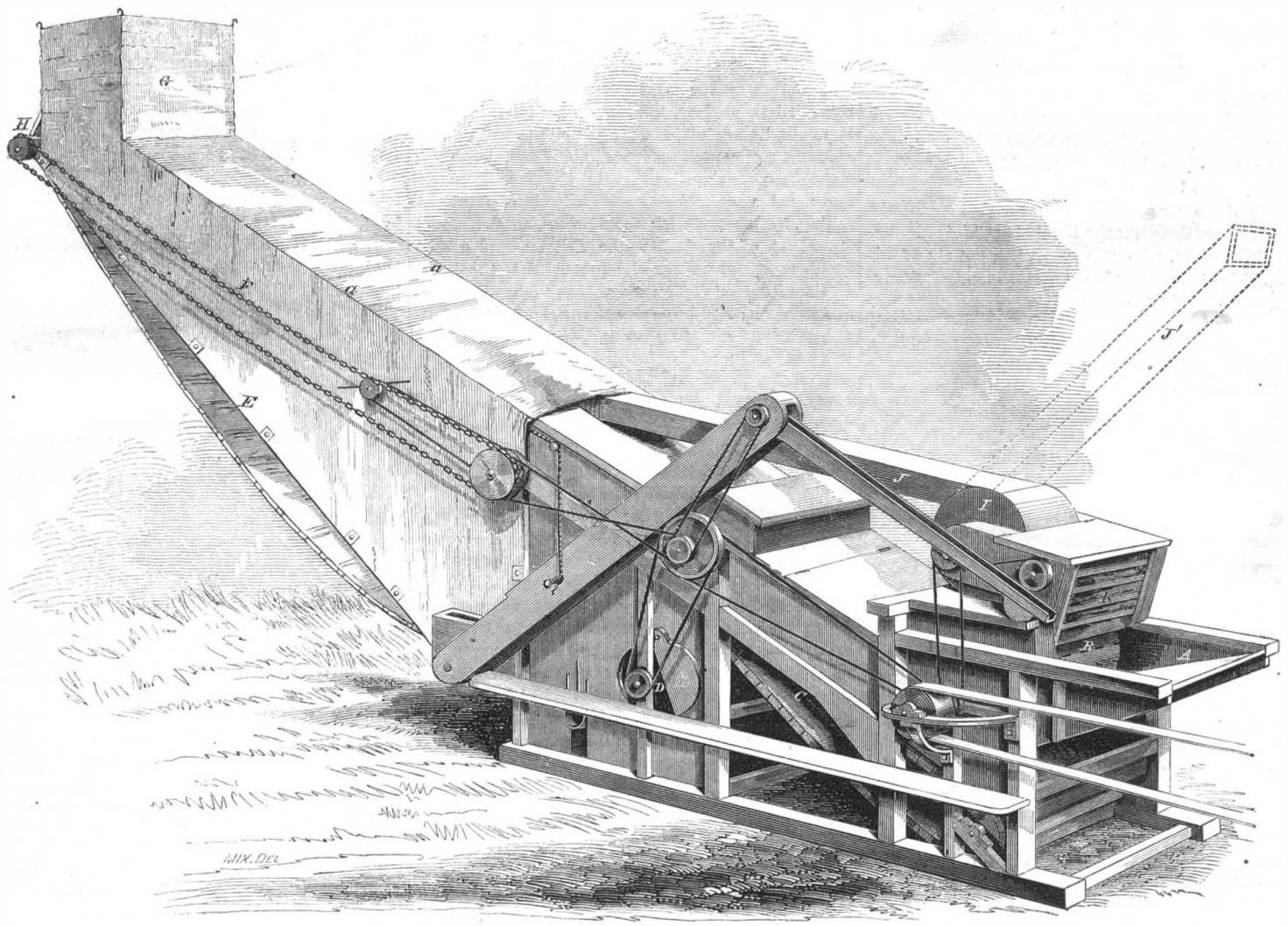
Scientific American.

A JOURNAL OF PRACTICAL INFORMATION IN ART, SCIENCE, MECHANICS, AGRICULTURE, CHEMISTRY, AND MANUFACTURES.

VOL. V.---NO. 2. NEW YORK, JULY 13, 1861. NEW SERIES.

Improved Thrashing and Cleaning Machine.

Nearly all the grain that is raised on large farms in this country is now separated from the straw by means of machines driven by horse power, and the large number of these in use makes any improvement in them of great value. The modifications illustrated in the accompanying engraving were devised by a practical man to overcome difficulties experienced in using the machine; the principal one being the blowing of straw and dust into the faces of the operators and among the grain, especially in case of a change of the wind. This evil was so serious that sometimes it was necessary to turn the machine and secure it in a new position four or five times in a day, suspending the work a third or a half of the time. There are also modifications in the belting and other parts which make the machine more efficient than those heretofore in use.



OVIATT'S THRASHING AND CLEANING MACHINE.

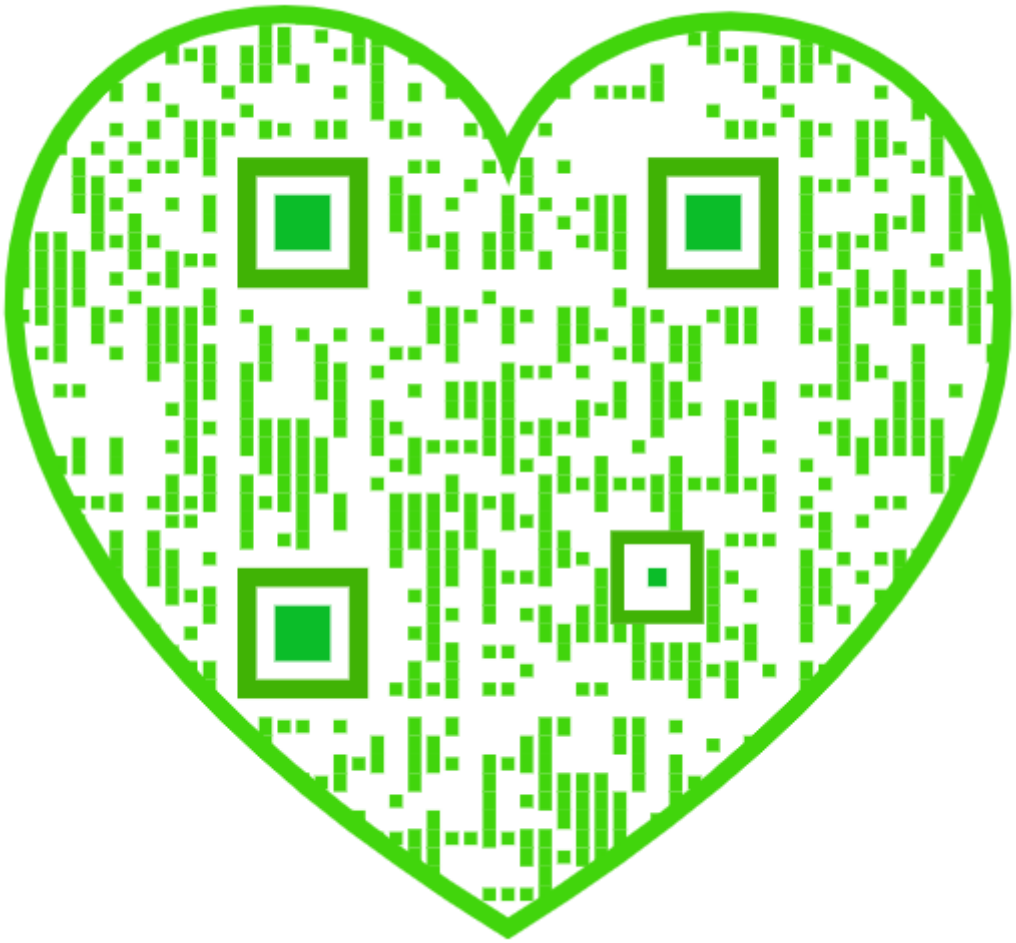
The engraving represents the improvements as applied to an ordinary Pitt's machine. The unthrashed straw and grain is fed into the hopper, A, when it passes between the rapidly revolving cylinder, B, and the conical bed beneath, the cylinder and bed both being garnished with short, stout iron spikes, which beat the grain out of the straw in its passage among them. Both the grain and straw fall upon the upper leaf of the endless apron, C, which carries them to the rear end of the machine, where the grain falls upon sieves and is shaken down through a blast of air produced by the revolving fan, D, while the straw is carried by a second apron either up the inclined plane, E, and deposited on the top of the stack; or the apron may be lowered to a horizontal position to simply carry the straw away. To carry the dust and chaff which ordinarily flies from the rear of the machine away with the straw, Mr. Oviatt surrounds the straw carrier, E, with the canvas tube, F; the outer end of the straw carrier, E, being sustained by the ropes, *a a*, which thus form supports for the canvas tube. By this arrangement the chaff, instead of being trampled under foot and wasted, is mixed with the straw in the stack and adds to the amount of fodder, while the great quantity of dust coming from the rear of the machine which ordinarily proves so great an annoyance to the workmen, is completely removed.

It having been objected that the dust passing up the tube, F, would suffocate the workmen employed in laying the stack, Mr. Oviatt has provided the vertical chimney, G, to carry the dust over the head of the workman. When this chimney is employed the flap valve or gate, H, which is hung on a hinge at its upper edge, permits the straw to be carried over the end of the straw carrier, E. To remove the great cloud of dust which ordinarily surrounds the front of the machine, a rapidly revolving fan is placed in the box, I, creating a strong draft into the machine just over the hopper. A box, J, carries this dust forward into the tube, F. When the tube, F, is not used, in case of a wind blowing into the rear of the machine, the tube, J, may be turned up in the position indicated by the dotted lines. In this case the motion of the fan must of course be reversed, which is done by twisting the belt that drives it. As the powerful draft into the box, I, is liable to draw in considerable quantities of unthrashed straw, slats, K, are placed across the mouth of the box, and by attaching these to leather bands at their ends so as to form an endless belt, and by giving this a motion downward, the feeding of the machine is greatly facilitated. The inventor says that this arrangement was fully tested last season with the most perfect success, removing the dust so completely from the front of the machine as to render the position of feeder, in place of being almost intolerable, the most desirable of any in operating a thrashing machine.

As in using thrashing machines on the prairies, it is necessary to carry a canvas to cover them in order to protect them from the rains, and as the canvas of the tube, F, is applicable to this purpose, this tube is constructed with a very trifling additional cost.

This invention has been secured by two patents, one

© 1861 SCIENTIFIC AMERICAN, INC.



issued July 10, 1860, and the second May 14, 1861. Application for a reissue of the first patent has been made through the Scientific American Patent Agency, and further information in relation to the matter may be obtained by addressing the inventor, S. E. Oviatt, at Richfield, Ohio.

THE WAR.

THE BLOCKADE.

The mouth of the Mississippi is blockaded by the beautiful steam sloop of war *Brooklyn*. The following spirited account of the capture of a steamer is given by a writer on board:—

U. S. Steamer Brooklyn, off Pass l'Outre, Entrance to Mississippi River, at the Bar, June 3, 1861.

We have captured several vessels, taken them as prizes, and the circumstances under which some of them were taken were exceedingly interesting. The splendid steamship *General Miramon* (under British colors, bogus transfer, probably—she was an American the other day), which has been dashing back and forth between New Orleans and Mobile every week for some time past, hove in sight here day before yesterday, and stood in for the bar. Suddenly she made us out, and away she shied seaward again, then headed in for the Northeast Pass, a few miles off, determined to run the blockade, and trusting to her light draught to carry her in there. Of course, when we made her out we ran for her at once. She cut and run for it like a good fellow. Soon as we got in range, she being nearly safe, we let drive a shot across her bows. She paid no heed still, and then we sent a shell right under her forefoot, just within a few yards (she was then floundering in the shoal water), when she concluded that it was a bad business to try to get clear of the *Brooklyn*, rounded to, and ran down under our stern.

But the chase!—oh, how exciting it was! We took her for a privateer at first. All hands were at quarters, everything in fighting trim, and when the shots were fired, the *furore* was intense. We at once sent a prize crew on board, a lieutenant taking formal possession, and sent her off, communicating with the commanding officer at Mobile. She had no passengers on board; but what else, can't say. An elegant prize.

IMPORTANT ARREST IN BALTIMORE.

The recent congressional election in Maryland shows conclusively that the people of that State are largely for the Union. The city of Baltimore, however, contains a strong secession element, and its public officers would seem to be on that side.

It has been for some time known that one of the most active of these was the Marshal or Chief of Police, George P. Kane, who was using the powers of his position in the most zealous manner in aid of the rebellion. That the government should allow this man to continue for several weeks, plotting and working for its overthrow, has been cited as extraordinary evidence of the timidity of the administration. The authorities having, however, learned that Marshal Kane and his confederates were making military preparations to attack the government, at length decided to put a stop to his proceedings, and orders were issued to General Banks, the military commander of the district, to arrest him. General Banks took his measures with the sagacity for which he is famous, and very early in the morning of Thursday, June 27th, Mr. Kane was taken from his house by an ample military force and quietly carried to Fort McHenry. At the same time the office of the Chief of Police was taken possession of, and Colonel Kenly, of the First regiment Maryland Volunteers, was appointed at the head of police as Provost Marshal. The Commissioners of Police, whose authority was thus superseded, made a protest against the proceeding and disbanded the police force. Colonel Kenly, however, immediately organized a new force, and the loyal citizens of Baltimore feel more safe than they have at any time before, since the breaking out of the rebellion. On searching the Marshal's premises, abundant evidence of his guilt was discovered in a large quantity of arms and munitions which were concealed under the floors. The following is the inventory:—

Cannon, four and six pounders	6
Assorted shot, pounds	3,000
Shell, pounds	1,000
Shot for steam gun, pounds	300
Muskets	663
Carbines	48
Rifles	43
Double barreled shot guns	3
Single barreled shot guns	8
Horse pistols	9
Small pistols	65
Bullet molds	132
Cartridge boxes	3
Dirk knives	8
Swords	5
Drums	8
Gum coats	33
Powder flasks	64
Canisters	117
Cartridges	40,000
Canisters of shot	7

Besides a lot of screw drivers, flannel bags, slow matches, &c., and the famous 12-pound cannon ball, on which was inscribed "From Fort Sumter; presented to Colonel G. P. Kane, Marshal of Police of Baltimore." A powder train four inches wide and two deep was also discovered, leading under different parts of the old City Hall, and under a heap of coal was found a bag of letters belonging to Kane, which were taken possession of by the Provost Marshal.

SKIRMISHING ON THE VIRGINIA RIVERS.

For some time, the goverment has kept a number of small steamers plying between Washington and Fortress Monroe, to keep open the communication between Washington and the sea, and to keep supplies from reaching the secession army across this part of the boundary line of the two forces. The whole flotilla was under the command of Capt. Ward, one of the most accomplished officers in the navy, the author of well-known works on marine steam engines, naval gunnery, &c. The vessels of the flotilla have frequently entered the mouths of the rivers that empty into the Potomac river and Chesapeake Bay, and cannonaded the rebel batteries planted along their banks; but these skirmishes have been of so trifling a character that we have generally omitted them from our account of the war. One has now occurred, however, which derives extraordinary importance from its having resulted in

THE DEATH OF CAPTAIN WARD.

About half way from Washington to the mouth of the Potomac, the river makes a long bend around a high point of land on the right or Virginia bank, called Matthias Point. Several days since, as Capt. Ward was passing this point in the steamboat *Freeborn*, the vessel was fired at with muskets by some secession troops who were concealed among the trees. The fire was returned by the two cannon which the *Freeborn* carries, and it has been the regular practice since for all vessels passing to send a few shot ashore. At length Capt. Ward determined to land a sufficient force to destroy the trees among which the enemy concealed themselves, thinking it possible, also, that it might be advisable to throw up breastworks, and station a regiment of infantry to hold the place. He accordingly sent up the river to the *Pawnee*, one of our naval vessels, for two boat loads of men, and taking, in company with the *Freeborn*, another small steamboat of the flotilla—the *Reliance*—and a still smaller craft—the *Dana*—he proceeded to the Point on the afternoon of Thursday, June 27th. The vessels were anchored broadside to the shore, and a cannonade commenced to drive the enemy away. After this had continued about an hour, a flag of truce was seen on the shore, and a boat being sent to it, it was found to be displayed by a runaway slave, who was taken on board the fleet. He said the enemy numbered at least 800 men. His story was evidently not believed, as the effort to land was persisted in, which would have been madness in face of such an overwhelming force. Two boats were manned, and proceeded to the shore, Captain Ward leading the way in the first cutter. The landing was safely effected, and the men ascended the slope from the river to a high table land above, when they were fired upon by the enemy's pickets. They returned the fire, and fell back to the boats. A third boat, with eight men as a reinforcement, then put off from the *Freeborn*, and Capt. Ward returned on board his vessel for the purpose of directing the cannonade to protect the second landing. The small force again ascended the acclivity, and began to erect a sand bag battery, under the superintendence of Lieut. Chaplin, of the *Pawnee*. But it seems that the negro's story was too near the truth. The battery was nearly completed, when Capt. Ward, who had been standing some time in the gallows frame of the *Freeborn*, directing the fire, suddenly gave orders to change the position of the bow gun, and hastened down on the forecastle deck to aim it himself. At the same time he sounded the whistle and hailed the shore: "All hands on board." From this it is inferred that he saw a large body of the enemy advancing to cut off our troops. The order was obeyed, and our men were hastening to the beach when a rifle volley was poured into them from among the trees, wounding several, one of them mortally. They all succeeded in getting on board the boats. Capt. Ward had sighted the gun, and was about to withdraw and give the word to fire, when he was struck by a bullet, saying to Harry Churchill, the boatswain's mate: "Churchill, I am killed." He fell into one of his arms, while Churchill pulled the string with the other, throwing the shot clear among the enemy.

"Slip the cable and start her," was now Lieutenant Lee's order, on assuming the command. It was done, and soon the *Freeborn* and all the boats were out of range of the rifles and muskets.

The *Pawnee* was now ordered alongside, and Dr. J. A. Moore, surgeon of the *Freeborn*, who had been sent on board the former vessel in the morning, returned to the *Freeborn*, accompanied by Mr. Frederick Ward, the captain's second son. Dr. Moore immediately pronounced the wound mortal. The ball had entered the umbilicus, and came out on the right side, near the back, perhaps passing through the liver and other vitals.

The captain was first laid on the quarter deck, but subsequently removed to a more convenient position. In removing him, he said: "Why remove me? I am quite comfortable." Here Lieut. Lee asked him if he could do anything for him. He only said: "Raise my head a little higher." To Dr. Moore, he once said: "Doctor, the wound is here," pointing to the pit of his stomach. The captain lingered for about three-quarters of an hour, when he expired after a few gasps. His son was by him when he breathed his last. The most profound grief pervaded the whole of the officers and crew of the *Freeborn*.

When it was known that the captain was mortally wounded, George Conch, captain of the after gun, exclaimed: "Boys, let us have our revenge." The gun was then pointed true, and the five-seconds shell burst right in the midst of the enemy. He was about to fire again, when the doctor forbade the disturbance of the captain's last moments, and Conch desisted.

Capt. Ward was born at Hartford, Conn., in 1806, and entered the navy in 1823. For the four years previous to the breaking out of the present war, he was in command of the Brooklyn Navy Yard. His wife and family are now in Germany, unconscious of the heavy intelligence that awaits them.

WESTERN VIRGINIA.

General McClellan's command continues to be augmented by reinforcements from the West, and it is said that he now has at least 20,000 men in Western Virginia. The Eleventh Indiana regiment, commanded by Colonel Wallace, is stationed at Cumberland, and on the 26th of June a brilliant skirmish took place between 13 pickets of this regiment and about 40 secession cavalry. It will be observed that this is the same eventful day on which the arrest of Marshal Kane and the death of Capt. Ward occurred. The following is Colonel Wallace's official account of the affair:—

A BRILLIANT SKIRMISH.

Cumberland, Md., June 27, 1861.

To General McClellen:—I have been acustomed to sending my mounted pickets, 13 men in all, to different points along the several approaches to Cumberland. Finding it next to impossible to get trustworthy information of the enemy, yesterday I united the 13, and directed them, if possible, to Frankfort, a town mid-way between this place and Romney, to see if there were Rebel troops there.

They went within a quarter of a mile of the place, and found it full of cavalry. Returning, they overtook 40 horsemen, and at once charged on them, routing and driving them back more than a mile, killing eight of them, and securing 17 horses. Corporal Hayes, in command of my men, was desperately wounded with saber cuts and bullets. Taking him back, they halted about an hour, and were then attacked by the enemy, who were reinforced to about 75 men. The attack was so sudden, that they abandoned the horses, and crossed to a small island at the mouth of Patterson Creek.

The charge of the rebels was bold and confident, yet 23 fell under the fire of my pickets close about and on the island. My fellows were finally driven off, and scattering, each man for himself, and they are all in camp now. One corporal, Hayes, of company A, was wounded, but is recovering. One, John C. Holdingbrook, of company B, is dead. The last was taken prisoner and brutally murdered. Three companies went to the ground this morning and recovered everything belonging to my pickets, except a few of the horses. The enemy were engaged all night long in boxing up their dead.

Two of their officers were killed. They laid out 23 on the porch of a neighboring farm-house. I will bury my poor fellow to-morrow.

I have positive information, gained to-day, that there are four regiments of rebels in and about Romney, under Colonel McDonald. What their particular object is I cannot learn.

The two Pennsylvania regiments are in encampment at State Line, nine miles from here, awaiting further orders. They have not yet reported to me. They hesitate about invading Maryland.

The report of the skirmish sounds like fiction, but it is not exaggerated. The fight was really one of the most desperate on record and abounds with instances of wonderful daring and coolness.

(Signed) LEWIS WALLACE,
Colonel Eleventh regiment Indiana Volunteers.
G. B. McClellan, Major-General.

FURTHER ARRESTS IN BALTIMORE.

The secessionists of Baltimore received another surprise on the morning of July 1st, on learning that

© 1861 SCIENTIFIC AMERICAN, INC.

Gen. Banks had again been busy before they were up. They found infantry and artillery stationed at various commanding points about the city, and all of the Police Commissioners, except the Mayor, safely locked up in Fort McHenry. Gen. Banks promptly issued the following proclamation, giving the reasons for his action, and the spirit in which he is using his powers.

PROCLAMATION OF GENERAL BANKS.

HEADQUARTERS, DEPARTMENT OF ANNAPOLIS, FORT MCHENRY, July 1, 1861.

In pursuance of orders issued from the headquarters of the army at Washington, for the preservation of public peace in this department, I have arrested and do now detain in the custody of the United States, the late members of the Board of Police, Messrs. Charles Howard, William Gatchell, Charles Hinks and John W. Davis. The incidents of the past week afforded full justification for this order. The headquarters under the charge of the Board, when abandoned by the officers, resembled in some respects a concealed arsenal. After public recognition and protest against the suspension of their functions, they continued their sessions daily. Upon a forced and unwarrantable construction of my proclamation of the 28th ult., they declared that the police law was suspended, and the police officers and men put off duty for the present, intending to leave the city without any police protection whatever. They refused to recognize the officers and men necessarily selected by the Provost Marshal for its protection, and held subject to their orders now and hereafter the old police force, a large body of armed men, for some purpose not known to the government, and inconsistent with its peace and security. To anticipate any intentions or orders on their part, I have placed temporarily a portion of the force of my command within the city. I disclaim, on the part of the government I represent, all desire, intention and purpose to interfere in any manner whatever with the ordinary municipal affairs of the city of Baltimore. Whenever a loyal citizen can be named who will execute its police laws with impartiality and in good faith to the United States, the military force will be withdrawn from the central parts of the municipality at once. No soldiers will be permitted in the city except under regulations satisfactory to the Marshal, and if any so admitted violate the municipal law, they shall be punished by the civil law and the civil tribunal.

NATHANIEL P. BANKS,
Major-General Commanding.

Miscellaneous Items.

A naval expedition is fitting out to operate on the coast of Texas. It consists of transports, carrying munitions of war and men, convoyed by small vessels of war. The former will take the field and form a nucleus, around which the Union men can rally.

There is some invaluable material in the Second Regiment of Wisconsin, which will be likely to exhibit its availability before the close of the war. The regiment embraces a fighting force of ten hundred and fifty men, among whom are two hundred and fifty who have graduated at some institution of classical learning; two hundred of them are lumbermen, not one in ten of whom have slept upon anything softer than a saw log in half-a-dozen years, and all are over five feet ten inches high; one entire company is composed of foundrymen and iron workers, and the remainder of the regiment is made up of mechanics and farmers.

While the United States steamer *Colorado* was at sea, on the evening of June 20, a break occurred in the after standard supporting the reversing shaft to the propeller. It had broken midway, and at a point where a triangular-shaped piece had been sawed out of the rib and a nicely-fitted piece of soft wrought iron inserted and fastened by a small tap bolt. The surfaces had then been filed smoothly and painted over as before. But for the breakage it would have escaped the most critical examination. A strict inspection was made of the other parts, resulting in the discovery of a similar work upon the forward standard of the reversing shaft. Several other flaws were discovered, and the conclusion was irresistible, that some villain had wrought all this mischief for the purpose of disabling the ship. A delay of thirty-six hours was caused before the repairs could be made, and the vessel again proceed on its course.

The English ship *Minion*, from England, bound to Savannah, was captured on the 23d June, off Charleston, by the United States gunboat *Union*. She had twenty thousand stand of arms, with ammunition and other contraband goods on board. The ship was sent to New York in charge of a prize crew. The *Union* also captured a brig loaded with sugar and molasses.

The steamship *Niagara* recently made her appearance off Fort Pickens. She carries a formidable armament, and is reported to have taken the Southern privateer steamer *Wm. H. Webb*, just as the latter was in the act of capturing a Northern brig called the *East*, of New York. The *Massachusetts* has also taken a prize off Key West, the *Etna*, an English bark, loaded with rifled cannon, &c., for Pensacola.

The *Hammonia*, which arrived on the 2d ult. from Southampton and Bremen, brings eleven hundred and forty cases of arms to a single house. Other consignments are also supposed to contain arms, rifles and muskets. This shipment brings us at least twenty thousand more guns. Others are coming.

It will be remembered by many of our readers that the frigate *Susquehannah* arrived in this port not long since, under command of Capt. Hollins, of Maryland. He resigned at once, and has signalized his entrance into the service of the secessionists by seizing the steamer *St. Nicholas* on its way from Baltimore to the Rappahannock river. The steamer left Baltimore on Friday evening last, with fifty passengers, many of whom were disguised as mechanics. The telegraphic dispatches state that among the number of disguised persons was Capt. Hollins, who assumed a woman's dress and retired to a stateroom. After the steamer left Point Lookout, Capt. Hollins threw off his disguise, and, with the aid of the passengers, seized the boat, which was immediately put across Coney river, on the Virginia side. Here the rest of the passengers were landed, including the captain of the boat, who was placed under guard. The steamer then went on a piratical cruise toward the Rappahannock river, capturing three vessels on her way, laden with ice, coal and coffee, with all of which Hollins made his way to Fredericksburg, Va. Here is a man who has been supported by the United States government turning traitor at a time when his services would be of value.

Who Began the War?

We have already answered this question by reference to facts, without regard to the clamor of partizans. We stated that it was begun by the leaders of the secession movement, and our position is fully sustained by the Hon. C. H. Wickliffe, of Kentucky, who has recently been elected to Congress. He is well known to be one of the most honorable men in the country. He says in a letter to his constituents:

It has been charged that this war has been inaugurated by the United States for the purpose of crushing and subjugating the slave States. This charge is not true. I was opposed to its commencement for any purpose. It was commenced by South Carolina and the seceded States by various acts of open hostility—by the seizure of the forts, arsenals, navy yards, custom-houses, subtreasury, mints, money, and property of the United States by armed force. After the capture of Fort Sumter the whole military force of the South was turned toward Washington city, with the declarations made by the officers and representative men of the Confederate States that their purpose and object were the seizure and occupation of Washington city and the overthrow of that government founded by Washington and his compatriots—the best government ever formed by man.

No patriot, no Kentuckian, could be willing to see, can now be willing to witness with indifference, the efforts of the Southern Confederacy to take possession of or destroy the capital of the nation, and destroy that government which has protected its citizens at home and abroad. Was it wrong to resist this determined and avowed purpose of the confederated men of the South? That capital must be protected and our government must be preserved. It is not "Lincoln's government," but the government of the people—the government of the United States—that I am anxious to preserve from destruction.

RIFLED CANNON IN THE NAVY.—At the Washington Navy Yard the Ordnance Department are working all night, principally on brass rifled guns, and boring the heavy iron rifled cannon cast at West Point. All the United States ships that sail have rifled guns, and in a few weeks the heaviest caliber of rifled guns will be afloat. The navy have borrowed of the War Department the fifteen-inch Rodman gun at Fort Monroe, and are preparing a vessel to receive it for operations near that fortress and especially upon Sewall's Point.

THE SUPPLIES OF MUNITIONS OF WAR.—The Washington agent of the associated press telegraphs that "it is ascertained from an official source that about 200,000 stand of arms have already been issued, leaving half that number at least still on hand, with others being constantly manufactured. These arms are additional to those furnished by State authorities. None have been ordered abroad through the Ordnance Bureau. Hence the recent importations must be on State or private account. Dealers and inventors are daily offering to supply the government, which, however, prefers its own patterns of uniformity. There is no lack of facilities, it will thus be seen, for arming all the troops that may be called into the field. There is abundance of ordnance and ordnance stores and other engines of warfare.

Orders for Navy Shoes.

The *Shoe and Leather Reporter* says that the contract to furnish the United States marine corps with 6,000 pairs of sewed bootees, more or less, was awarded for the current year to Henry Newton, of North Weymouth, Mass., at $1.87½ per pair. Our cotemporary adds:—

This rate was much less than that of last year, which was $2.30. The standard is a high-cut sewed shoe, both upper and sole being made of oak-tanned leather. The rate of this contract was considered very low at the time; but the great decline in prices of all kinds of stock and work now makes it very remunerative. Mr. Newton employs about 300 men, and is turning out from 1,500 to 1,800 pairs of shoes per week.

The contract for low-cut shoes, for sailors' use, was awarded to a Philadelphia house, for one year from July 1, 1861. The rate we have not learned, but it was probably somewhat under that of the previous year, which was about $1.42. These shoes are all first-class, no others being accepted.

Great corruptions have at times existed in the marine department, and third and fourth quality shoes have sometimes been used; but the efficiency of the present Quartermaster of the marine corps—W. B. Slack—has remedied these evils.

PATENTS IN THE SOUTHERN CONFEDERACY.—We understand that Rufus P. Rhodes, Esq., of Mississippi, has received the appointment of Commissioner of Patents for the Confederate States. Mr. Rhodes was formerly an Examiner in the Patent Office, and a member of the Board of Appeals. He was generally esteemed in the Patent Office, and discharged his duty with fidelity until the secession fever broke out, when he retired to his home, and actively promoted the interests of the Southern Confederacy. The Richmond *Dispatch* states that this branch of the Southern new government is about going into operation under favorable auspices. Commissioner Rhodes has arrived from Montgomery, opened his department at Goddin's building, and in a very short time will be ready to proceed to business. No less than twelve applications for new patents, forty applications to revive old ones, forty caveats, filed for future action, and numerous assignments for record, await the action of the commissioner.

CAPTURE OF A REVOLVING GUN.—A member of the Thirteenth regiment, Colonel Smith, writing to the Brooklyn *Eagle*, says that Corporal William H. Russel, of Company E, discovered a revolving gun in Baltimore on the 24th ult., and with a squad of men took possession of it. It is owned by Wm. Wilkins, of New York, and was invented by Emerson Ames, who is now in Europe trying to dispose of the model. It is mounted on a two-wheeled carriage, has eight chambers, and is capable of being fired forty times a minute by four men. It carries a 1½-pound Minié ball, of two inches diameter, and will carry one mile with one and a half ounces of powder. It is one of the most simple and complete pieces of mechanism yet invented. When first discovered, the machine was in pieces, and concealed among a lot of curled hair, in a shop in Baltimore. It has been put together, and will be sent to Fort McHenry.

AGES OF THE GENERALS.—Lieutenant-General Scott is 75 years old; General Wool, 73; Harney, 65; Mansfield 60; Totten (head of the Engineer corps), 80; Thayer (Engineers), 80, Creig (head of the Ordnance Department), 76; Ripley (Ordnance), 70; Sumner 65; Larnard (Paymaster General), 70; Gibson (Commissary General), Churchill (Inspector General), and Thomas (Adjutant-General), are all old men, having entered the army in the beginning of the present century—Gibson in 1808, and Churchill in 1812. General McClellan is 35; General Fremont is under 48; General Lyon is about 44; General Butler is 43; and General Banks is 44; General McDowell is about 40.

ICEBERGS AND RIFLED CANNON.—The English screw steam frigate *Mersey*, Capt. H. Caldwell, has reached Halifax. When approaching the banks of Newfoundland, Capt. C. fell in with some icebergs, and thought it would be interesting to experiment on them with rifled cannon. Accordingly an Armstrong shell was fired at an iceberg about 150 feet high, at a distance of about four miles and a half. Such was the effect, that a block of ice, judged to be of about 100 tuns, fell from the summit. This large weight falling from the top of the iceberg removed the center of gravity, which caused the whole fabric to roll over and rock to and fro. It was considered a most satisfactory test of the vast range and destructiveness of these missiles.

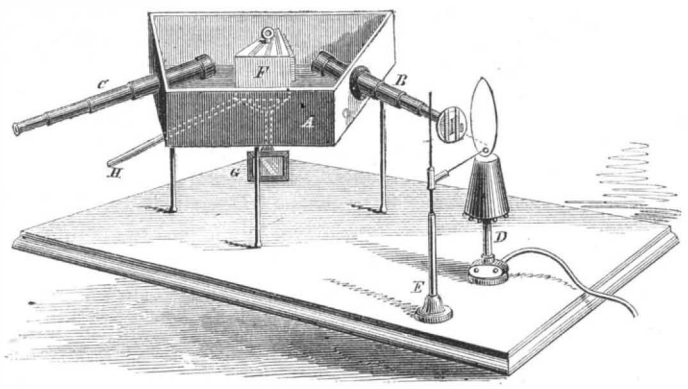
© 1861 SCIENTIFIC AMERICAN, INC.

SPECTRAL ANALYSIS.

There is no subject attracting more attention at the present time among men of science throughout the world, than the newly discovered process of spectral analysis; its marvelous results naturally commanding attention. On page 185, Vol. 2 (new series) of the SCIENTIFIC AMERICAN, will be found an engraving, with a full description of the solar spectrum, and on page 90 of the last volume a cut of the dark lines, by which this spectrum is crossed. It is by means of similar lines, (though *bright* ones), in the spectra of artificial lights that the new mode of analysis is conducted.

If any metal is evaporated in a gas flame and a narrow spectrum of the light thus produced is formed, by passing the light first through a narrow slit in a screen, and then through a triangular prism, *bright lines* will be seen extending across the spectrum, the light from one metal having lines in one part of its spectrum, and those of another metal in a different part; but the light of each metal always having its own characteristic lines with invariable uniformity.

The bright lines produced in this manner show themselves most plainly when the temperature of the flame is highest and its illuminating power least;—hence Bunsen's gas-burner, which gives a flame of very high temperature and very slight luminosity, is well adapted for experiments on the bright lines of the flame-spectra produced as above described.



The apparatus employed by Messrs. Kirchhoffs and Bunsen in their spectrum observations is thus described in *Poggendorff's Annalen* (Bd. cx. § 162):—

A is a box blackened on the inside, having its horizontal section in the form of a trapezium, and resting on three feet; the two inclined sides of the box, which are placed at an angle of about 58° from each other, carry the two small telescopes B and C. The eye-piece of the first telescope is removed, and in its place is inserted a plate, in which a slit made by two brass knife-edges is so arranged that it coincides with the focus of the object-glass. The gas-lamp D stands before the slit in such a position that the mouth of the flame is in a straight line with the axis of the telescope B. Somewhat lower than the point at which the axis of the tube produced meets the mouth, the end of a fine platinum wire bent round to a hook is placed in the flame. The platinum wire is supported in this position by a small holder E, and on to the hook is melted a globule of the dried chloride which it is required to examine. Between the object-glasses of the telescopes A and C is placed a hollow prism F, filled with bisulphide of carbon, and having a refracting angle of 60°; the prism rests upon a brass plate, movable about a vertical axis. The axis carries on its lower part the mirror G, and above that the arm H, which serves as a handle for turning the prism and mirror. A small telescope placed some way off is directed toward the mirror, and through this telescope an image of a horizontal scale fixed at some distance from the mirror is observed. By turning the prism round every color of the spectrum may be made to move past the vertical wire of the telescope C, and any required position of the spectrum thus brought to coincide with the virtical line. Each particular portion of the spectrum thus corresponds to a certain point on the scale. If the luminosity of the spectrum is very small, the wire of the telescope C may be illuminated by means of a lens, which throws a portion of the rays from a lamp through a small opening in the side of the tube of the telescope C.

From a long series of preliminary experiments with this apparatus, the authors satisfied themselves that the appearance of certain bright lines in the spectra may be regarded as absolute proof of the presence in the flames of certain metals, and that they serve as reactions, by means of which these bodies may be recognized with more certainty, greater quickness, and in far smaller quantities, than can be done by help of any other known analytical method, no matter what may be the nature of the body with which the metals are combined.

The wonderful delicacy of the spectrum-reaction of *sodium* is evinced by the following experiment, which the writer had the good fortune to witness in the laboratory of Professor Bunsen in Heidelberg. In a far corner of the experiment room, the capacity of which is about 60 cubic metres (one cubic metre = 35.3 cubic feet), was burnt a mixture of 3 milligrames (0.0462 gr.) of chlorate of sodium with milk sugar, whilst the non-luminous flame of the lamp was observed through the slit of the telescope. Within a few minutes the flame, which gradually became pale and yellow, gave a distinct yellow sodium line, coincident in the solar spectrum with Fraunhofer's dark line D, lasting for about ten minutes, and then entirely disappearing. From the weight of the sodium salt burnt, and the capacity of the room, it was calculated that in one part by weight of air, there was suspended less than 1-20,000,000 of a part of soda smoke. As the reaction can be quite easily observed in one second, and as in this time the quantity of air which is heated to ignition by the flame could be calculated from the rate of issue, and from the composition of the gases of the flame, the surprising result came out that the eye is able to detect with the greatest ease quantities of sodium salt less than 1-30,000,000 of a milligramme in weight. The reaction of *potassium* is not nearly so delicate; the spectrum contains only two characteristic lines, one in the outermost *red*, and the other far in the *violet* ray of the solar spectrum—points at which the eye ceases to be sensitive to the rays. The presence, however, of 1-1000 of a milligramme of the metal could be readily detected. *Lithium* gives two sharply defined lines—the one a very weak *yellow* line, and the other a bright *red* line, both towards the extreme end of the solar spectrum; though the reaction is not so sensitive as with sodium, it is by far the most delicate test for the metal, the eye being capable of distinguishing with absolute certainty a quantity of carbonate of lithium less than 9-10,000,000 of a milligramme in weight. The authors found to their surprise that lithium, instead of being a rare substance, was a very widely distributed one, occurring in almost all bodies. They found it in the water of the Atlantic; in the ashes of marine plants; in pure spring water; in the ashes of tobacco, vine leaves, and of grapes; and even in the milk of animals fed on crops growing in the Rhine plain, on a non-granite soil. *Strontium*, *barium*, and *calcium* all give characteristic spectra; that of *strontium* is characterized by the absence of *green* bands. It contains, however, eight remarkable ones, namely, six *red*, one *orange*, and one *blue* line. To examine the intensity of the reaction, Kirchhoff and Bunsen threw up into the air of the room, in the form of fine dust 0,077 grm. of chloride, and thoroughly mixed the air by rapidly moving an unberella; the lines immediately came out and realized the presence of the 6 100,000 part of a milligramme of strontium. The *barium* spectrum is distinguished by two very distinct *green* lines, by which the authors were enabled to detect with certainty 1-1,000 of a milligramme of metal. *Calcium* gives a broad very and characteristic *green* line, and, moreover, a bright *orange* line lying near the red end of the spectrum. 6-10,000,000 of a milligramme of the chloride of the metal could be easily detected. It is particularly worthy of note that the spectra-reactions of different kinds of metal do not interfere with one another; that each being characterized by some one or more special lines, it is easy to make a qualitative analysis of a compound containing several elements: thus, Kirchhoff and Bunsen were enabled to exhibit the reactions of *potassium*, *sodium*, *lithium*, *calcium*, and *strontium*, in several mineral waters; to show the bands of *sodium*, *potassium*, *lithium*, and *calcium* in the ash of a cigar moistened with hydrochloric acid, and to point out differences in the composition of various limestones. But the greatest triumph of the new method of analysis was the discovery of a fourth member of the group of alkali metals. While working on the residue of a mineral water from Kreuznach, a spectrum was obtained which gave lines as simple and characteristic as those of lithium and sodium, but which were *blue*, and were not referable to any known element; these indefatigable chemists evaporated down no less a quantity than *twenty tuns* of the water, and obtained 240 grains of the platinum salt of the new metal, which they call *cæsium*, from the Latin word *cæsius*, signifying grayish blue, that being the tint of the two spectral lines which it shows. The new metal is very analogous to potassium, but differs from it in the solubility of its nitrate in alcohol. Its equivalent number is 117, being exactly three times that of potassium. It is scarcely possible to overrate the probable importance to chemical science of this new and beautiful method of analysis. "In spectrum analysis," observes the authors, "the colored bands are unaffected by any alteration of physical conditions, or by the presence of other bodies. The positions which the lines occupy in the spectrum, indicate the existence of a chemical property as unalterable as the combining weights themselves, and may therefore be estimated with almost astronomical precision; it extends almost to infinity the limits within which the chemical characteristics of matter have hitherto been confined. By an application of the method to geological inquiries, the most valuable results may be expected; it opens out the investigation of an entirely untrodden field.

A GUTTA PERCHA FLOATING BRIDGE.—Mr. John Ryder, of this city, is about to submit to the government a new invention of a gutta-percha floating bridge, which, it is claimed, will be of great benefit to our army when a river has to be crossed, and no standing bridges are near. The forward part of the bridge, it is said, can be formed into a barricade in a few minutes' time, and be perfectly bullet-proof. The structure is divided into sections twenty feet long by twenty inches in diameter; each section being supplied with a large air chamber to be inflated with air, and which the inventor asserts will sustain twenty-two hundred pounds. The chamber is similar to a clipper ship's bottom. The sections are united by lacing with hemp rope, the eyelet holes being about six inches apart. Over the sections, plank, if necessary, can be laid down; the space between each section being sufficiently wide for men, horses, and artillery to pass without the slightest inconvenience. Any number of sections can be used at once, and very little time is consumed in putting them together. The barricade referred to is formed by drawing up the leading sections with guy lines, behind which the soldiers can work their guns to a good advantage.

Dr. RODET, of Lyons, France, who has for a long time devoted his attention to researches for an antidote to various animal poisons, as in glanders, syphilitic virus, &c., employs topically, a liquid containing perchloride of iron as a basis, which he has found very efficacious, as it destroys the virus after the bite of a rabid animal.

TO PREVENT FLIES FROM TEASING HORSES.—Take two or three small handfuls of walnut leaves, upon which pour two or three quarts of soft cold water; let it infuse one night, and pour the whole next morning into a kettle, and let it boil for fifteen minutes. When cold, it will be fit for use. No more is required than to wet a sponge, and before the horse goes out of the stable, let those parts which are most irritated be smeared over with the liquor.

BLISTERED FEET.—A writer says:—"I had for several years two sons at school at Geneva, Switzerland. In their vacations they, in company with their tutor, made excursions through Switzerland, Italy, Germany, &c., on foot; bearing their knapsacks containing their necessary wants for a month. They were provided with a small bar of common brown soap, and before putting on their stockings turned them inside out, and rubbed the soap well into the threads of them; consequently they never became foot sore, or had blistered feet. Let our volunteers try it, and my word for it they won't complain of sore or blistered feet."

© 1861 SCIENTIFIC AMERICAN, INC.

Commencement Exercises of the Polytechnic College, Philadelphia.

The Annual Commencement exercises of the Polytechnic College of Pennsylvania were celebrated in Philadelphia on the evening of June 27th. The platform was occupied by the Trustees and Faculty of the Institution, Governor Curtin presiding as Chairman of the Board of Trustees.

The exercises were opened with prayer by the Rev. Henry Steele Clarke, D.D. After music by the Germania Orchestra, Dr. A. L. Kennedy delivered an address in the absence of Morton McMichael, Esq., whose name was on the programme. He spoke of the establishment of Polytechnic Colleges in Continental Europe, and of the immense amount of practical learning taught by them, after which he alluded to the origin of this class of Colleges in America, one-third of a century after their practical workings had been tested in France and Germany. It was at first suggested that we might as well have a Polytechnic branch to a literary institution, and not set it up by itself; the prestige of some established college would, it was thought, help the new enterprise along. But on looking at the European system, it was found that though France had a noble university, with literary, theological and other branches, yet the Polytechnic was a separate institution. This was also the case in Germany, for the Polytechnic College of that nation was at Carlsruh and not at Heidelberg, where the great University was located. Besides, investigation proved that whenever a literary institution was united with a medical or other professional school, it was found that one branch grew unnaturally at the expense of the other. So it was determined to establish, under a distinctive charter, the present institution. On applying to the State Legislature for the charter, it was found that some of the members actually were ignorant of the very name of such a college as the "Polytechnic." In fact, one legislator said he saw no use in having a college to teach fire-work-making—he having confounded "pyrotechnics" with "polytechnic." After the college was started, a student applied to the faculty under the same error, and was sent to Professor Jackson. [Laughter.] The speaker then referred to the advantages of teaching engineering, inasmuch as the graduates would either make good civil or military engineers. He closed amid applause.

The Hon. Wm. Strong was the next speaker. After the applause of his reception had ceased, he delivered an address at once able, eloquent and thoughtful. His theme was the growth and progress of the arts and sciences, from the days when the Chaldean shepherds introduced astronomy and astrology, down through the strange civilization of the Egyptians, the broader and more republican culture of the Greeks; the powerful developments of Roman art, and the abstruse and cloistered arts and sciences of the dark ages. He remarked that in former times knowledge was less practical, inasmuch as it was confined to the favored few who had leisure for its prosecution, and who were not driven by stern necessity to seek out the most practical and useful developments of sciences and art, as we are, in these democratic days. The speaker then eulogised the present age as one peculiarly blessed in the daily developments of elevating and refining arts and sciences, and he argued that so diffused was knowledge in our times that it was impossible for any man to keep the results of a beneficial invention or discovery to himself. Whether a selfish discoverer wills it or not, the world must and will share in the results of his genius and labor. Further, the speaker indulged in some interesting speculations as to the emotions which would be felt by the great men of science and art of former ages, from Archimedes to Arkwright, Franklin, Watt and Rittenhouse, could they revisit our earth and see the vast improvements made on their ideas. And even the farmer, the housekeeper, and the masses of former times, would be filled with amazement could they see our modern wonders, such as reaping machines, drills, sewing machines, &c. The remarks of Judge Strong were heartily applauded.

Governor Curtin conferred the Academical degrees upon the following graduates:—

Degree of Bachelor of Civil Engineering.—Arthur M. Casimajon, Cuba.—Subject of Thesis—"Design and Description of Passenger Railroad Depot." Thomas De Cubas, Canary Islands—"The Steam Engine." John Fornance, Norristown, Pa.—"Aqueducts and their Construction." Edward S. Hutchinson, Newtown, Pa.—"Railroads, their Location and Construction." William F. Law, Carlisle, Pa.—"Roads and Road Making." James W. Hutchinson, Griggsville, Ill.—"Illuminating Gas." Lewis W. Robinson, Haddonfield, N. J.—"Plan and Description of an Iron-arched Railroad Bridge." Jos. B. Hutchinson, Bristol, Pa.—"Suspension Bridges and their Construction."

Degree of Bachelor of Chemistry.—F. W. Roebling, Trenton, N. J.—"The Analysis of Iron Ores, Steel, &c." Joseph C. Roop, of Germantown, Pa.—"Economy in Chemical Manufacture and the Utilizing of Waste Materials."

Bachelors of Three Years' Standing.—*Master of Mine Engineering*—D. R. Brower, Jr., of Norristown. *Master of Chemistry*—Henry C. Eckstein, Philadelphia. *Master of Mechanical Engineering*—L. N. Francine, of Camden, N. J.

Ex-Governor Pollock then made a very felicitous address. In opening, he alluded to the two graduates who were absent defending the honor and the flag of their country. He next addressed himself to the graduates on the platform, and urged them to the exercise of manliness and virtue. The exercises then closed with the benediction by Rev. Dr. Duchachet. The band then played patriotic airs, which were responded to with enthusiasm by the audience.

Working Steam Expansively at a High and Low Pressure.

The following, from the London *Engineer*, deserves the attention of all those who make and use engines:—

In the last annual report of the Manchester Association for the Prevention of Steam Boiler Explosions, Mr. Harman, the late chief inspecting engineer, gave particulars of the performance of 108 steam engines from which he had taken indicator diagrams during the year. Sixty of these were ordinary condensing engines, nine were non-condensing, and thirty-nine were "compound," or high and low pressure condensing engines. Of four condensing engines, working with steam of 15 lbs. and under per square inch, and exerting, together, 203 indicated horse-power, the average consumption of coal per hourly horse-power was 8.3 lbs.; thirty-five condensing engines, worked with steam of between 16 lbs. and 30 lbs., and exerting an aggregate of 4,228 indicated horse-power, burnt 5.8 lbs. coal on the average. This, too, was the hourly rate of nineteen condensing engines, working with steam from 31 lbs. to 45 lbs., and exerting, in all, 2,480 indicated horse-power. Two condensing engines, working with steam of from 46 lbs. to 50 lbs., and exerting 79-horse power, burnt an average of 4.5 lbs. coal. Of all the ordinary condensing engines, the worst burnt 9.8 lbs., and the best 3.4 lbs. coal per hourly horse-power. A non-condensing engine, working steam between 16 lbs. and 30 lbs., and exerting 15-horse power, burnt 11.9 lb. Five other non-condensing engines, working steam of between 31 lbs. and 45 lbs., and exerting 332-horse-power, burnt an average of 9.4 lbs. Three other non-condensing engines, working with steam of between 46 lbs and 60 lbs., and exerting, in all, 194-horse-power, burnt 6.8 lbs. The most economical of all the non-condensing engines burnt 5.1 lbs. per hourly horse-power, or, rather, that quantity of fuel was expended, being burnt under the boilers. The compound engines worked with more economy, those supplied with steam at the higher pressures making the best show in the table. The worst result with this class of engines was 8 lbs. coal—the best, 3 lbs. Mr. Harman supplied a table also, classifying the condensing engines according to the period at which the steam was cut off on each stroke. Of fifteen condensing engines, working steam of from 16 lbs to 30 lbs., and exerting an aggregate of 1,572-horse power, the average expenditure of coal, cutting off at less than one-fourth stroke, was 5.7 lbs. Sixteen condensing engines, working within the same range of pressures, and exerting 2,429-horse-power, but cutting off at from one-fourth to one-half stroke, burnt an average of 6 lbs. coal, as did also four condensing engines, working at the same pressure, but cutting off later than half-stroke. Of condensing engines working steam of less than 15 lbs., and cutting off at between one-fourth and one-half stroke, one burnt 6.8 lbs. coal; and with two others, in which, with less than 15 lbs. steam, the point of cut-off was later than half-stroke, the consumption of coal was 9.8 lbs. per hourly indicated horse-power. Six condensing engines, working steam of from 31 lbs. to 45 lbs., exerting 878 indicated horse-power and cutting off earlier than one-fourth stroke, burnt 5 lbs. coal. Thirteen condensing engines, working within the same range of pressures, exerting 1,605-horse power, and cutting off between one-fourth and one-half stroke, burnt an average of 5.8 lbs., the lowest rate of consumption being 3.6 lbs. Two condensing engines, working steam between 46 lbs. and 60 lbs., exerting 80 indicated horse-power, and cutting off earlier than one-fourth stroke, averaged 4.5 lbs. The general result with each class of engines was, that the higher the pressure of the steam, and, correspondingly, the earlier the suppression, the greater the economy. The low pressure non-condensing engines, to which we have already referred, have been known to burn 15 lbs., 20 lbs., and, in some instances, upwards of 30 lbs. of coal per hourly indicated horse-power.

The history of the scientific expedition of the Austrian frigate *Novara* around the world is in progress. The first volume has appeared, 1,500 copies in English and 5,000 in German. This homage to the English language is a curious literary fact.

The Future of the United States.

The *North British Review*, for May, thus closes an article on American affairs:

There surely cannot be a *permanent* retrogression and decay in a nation planted in the noblest principles of right and liberty, and combining, in marvellously adjusted proportions, the vigorous and energetic elements of the world's master races, in the midst of which the tone is given and the march is led by that one of them which has never faltered in its onward course, and which is possessed of such tenacity and versatility, that it is everywhere successful. The present calamity and confusion probably form the crucible fires in which the Union is to be "purified, made white, and tried," in order that she may take her destined place in the van of the world's progress in Christianity and civilization, fulfilling in the resistless march of her dominant Anglo-Saxon race across the American continent, one grand part of the Divine scheme for the spread of that Gospel which shall survive all changes, overthrow all evils, and achieve its mightiest triumphs in the later days of our world's history.

What Influences our Climate.—I cannot omit directing the reader's attention to the influence which the far-distant barrier of Central America has upon the climate of Great Britain. Supposing yon narrow belt of land to be suddenly whelmed by the ocean; then, instead of circuitously winding round the Gulf of Mexico, the heated waters of the equatorial current would naturally flow into the Pacific, and the Gulf Stream no longer exist. We should not only lose the benefit of its warm current, but cold polar streams, descending further to the south, would take its place, and be ultimately driven by the westerly winds against our coasts. Our climate would then resemble that of Newfoundland, and our ports be blocked up during many months by enormous masses of ice. Under these altered circumstances, England would no longer be the grand emporium of trade and industry, and would finally dwindle down from her imperial station to an insignificant dependency of some other country more favored by Nature.—*Hartwig's Sea and its Wonders.*

Instantaneous Photography.—Amongst the most notable photographs figuring in the present French Exhibition are some remarkable instantaneous pictures by Messrs. Ferrier (father and sons) and Soulier. They are described by *Le Moniteur de la Photographie*, as the most perfect things of the kind ever produced; and from their subjects necessarily involve the conditions of complete instantaneity to obtain any degree of success.

They consist chiefly of views of one of the most crowded Parisian thoroughfares, the Boulevard de Sebastopol. Not one of a thousand figures of all kinds, foot passengers and vehicles passing in all directions, shows the slightest sign of movement or imperfect definition. Figures standing in the shadows of porticoes are all perfectly rendered, although the exposure was but the imperceptible fraction of a second.

To Clean Kid Gloves.—It is not white gloves alone that require cleaning; green, buff, mauve, and light gloves are always fashionable, but they soon soil, and thus lose their beauty long before they are worn out. To clean such gloves:—Take two ounces of white curd soap, or of cold cream soap; a quarter of an ounce of carbonate of potass; four fluid ounces of water; and one drachm of carbonate of ammonia. Cut the soap up fine, and boil it gently in the water; when of a uniform paste, add the ammonia and the carbonate of potass, and stir the mass well together. Then put it into a jar, and when cold it will set. The directions for uses are:—Rub the paste on the gloves (upon the hand) with clean flannel, and as the dirt disappears use more clean flannel to brighten them. If the paste gets hard add hot water.—*Septimus Piesse.*

M. Aich, of Brussels, is reported to have produced a new metallic alloy, which presents the advantage of working as well cold as hot, and which may be forged without losing its cohesion: melts very readily, and can be afterwards submitted to the operations of hammering, rolling, and punching. It is said to be cheaper than brass, and to cost much less than red copper. In the state of homogeneous fusion, it consists of 60 parts copper, 38.2 of zinc, and 1.8 of iron.

The common vocabulary in all languages is limited. An agricultural laborer employs about three hundred words, an eloquent speaker often uses ten thousand. The Bible contains six thousand. Milton uses eight thousand and Shakspeare fifteen thousand!

© 1861 SCIENTIFIC AMERICAN, INC.

An Important Invention of Night Telegraph Army Signals.

We take the following from the Boston *Traveler*:—

A plan for communicating between lighthouses, forts, ships of war, &c., at night, by means of signal lights, has been invented by Mr. H. P. Tuttle, one of our Harvard Observatory astronomers. This invention consists of a box about 6 inches wide and 12 long, with an aperture in front through which is seen a brilliant light. The aperture is provided with a cut-off which is worked by a lever, and the system by which the characters are made is precisely the same as those of our Morse telegraph. Different combinations of length (there being only two lengths), with the number of times the light is cut off, designating each letter of the alphabet, which are read by sight; whereas, the same characters over a telegraph wire are read in our telegraph offices by sound. The distance at which the light can be read depends upon the quality and size of the lens, which is immediately behind the aperture. Those already experimented with are common dark lanterns, and are brilliant enough to be read distinctly at a distance of three miles. Lamps can be made at a very slight cost, which can be read 10 miles with the naked eye, and by aid of glasses, 25 miles.

Powerful lights can also be used, which may be read 25 miles or more with the naked eye. Two of our telegraph operators, in connection with Mr. Tuttle, experimented on the night of the 12th ult., between the cupola of the State House and the top of the Bunker Hill monument, carrying on a spirited conversation without the slightest trouble. From 10 to 15 words per minute were transmitted with rough and imperfect machines. The rapidity of transmission can be considerably increased by using machines of improved manufacture.

It is not necessary for telegraph operators, exclusively, to operate these machines, although they can operate much faster than others. Any man of ordinary intelligence and quickness of comprehension, by committing the alphabet to memory, could read and write slowly, and increase in rapidity as fast as "practice makes perfect."

It has been remarked that, for war service, many others than the correspondents, would understand the lights; but this obstacle to its introduction is very easily removed by transmitting dispatches in cypher, which is an easier method of sending the same amount of matter, and, at the same time, unintelligible to all excepting the correspondents themselves.

Since the above was set up in type, we have received the following letter on the subject:—

CAMBRIDGE, Mass., June 29, 1861.

MESSRS. EDITORS:—About nine weeks ago I contrived and put into operation a method of telegraphing at night by means of lights, by making the time of the disappearance of any fixed light correspond to dots and lines of the Morse alphabet, and also by making the time of the appearance of a light correspond to the same thing.

My idea was that it would be of great use in army and naval operations, and it was brought before some of the influential men at Washington about six weeks ago; about three weeks since, an account of its performance was published in the Boston *Traveler*.

I was urged to take out a patent, if possible; but, believing it not to be so, and thinking it would be better for me in the end to give it to my country gratis, I declined to make application.

Yesterday I was surprised to learn that a Virginian had taken out a patent about ten days since for the same thing. He has evidently purloined my invention. I write to learn if a patent has been granted for such a contrivance, and whether, in the eyes of the law, the use of lights in that manner is patentable. I think not. Yours, respectfully,

HORACE P. TUTTLE.

The invention is undoubtedly patentable by the original inventor, as it embraces a new and useful improvement. No person has obtained an American patent for the above system of signalizing within the period named by our correspondent.

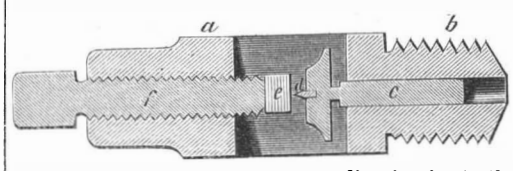
VALUABLE EXPERIMENTS IN GUNNERY.

There has been in progress for several years, at the national expense, a series of costly experiments to determine the best form and material for cannon and the qualities desirable in gunpowder. They were conducted at the Alleghany and Watertown arsenals, under the care of Capt. T. J. Rodman, of the Ordnance Department, United States army, one of the ablest and most learned of that highly accomplished body of men who have been educated at the national military school of West Point.

He has furnished a history of his investigations in a series of elaborate reports to the War Department, which have been beautifully printed and bound by Charles H. Crosby, of Boston. The rational plans on which the experiments were arranged to determine the points under investigation; the care, skill and thoroughness with which they were conducted; and the intelligence, ability and candor with which they are discussed, are remarkable even at this day, when all departments of experimental science are characterized by these qualities.

In the course of his experiments, Capt. Rodman obtained much information of general interest, especially at the present time, when the minds of the whole community are directed to matters pertaining to war. Perhaps the most interesting of these are the facts in relation to the pressure in a cannon at the time of its discharge, exerted by the gases resulting from the combustion of the powder. To measure this pressure an instrument was devised, which is illustrated in the accompanying engraving.

A hole about a third of an inch in diameter is drilled through the wall of the gun to the bore, and the outer portion of this hole is enlarged to receive the end of a cylinder, *a*, which has a piston working within it. In the cut, *b* represents the portion of the cylinder which is screwed into the hole in the cannon, and *c* is the piston corresponding in size to the smaller portion of the hole. The gases, pressing on the inner end of the cylinder, force it outward. Its outer end is armed with a steel point, *d*, which is forced into a copper bar, *e*, to a depth depending upon the amount of the pressure. The copper bar and steel point are then placed under massive steel yards, and the force required to produce an indentation equal to that produced by the gas is accurately weighed. Capt. Rodman says that a difference of 250 lbs. in 30,000 is plainly perceptible, "so that the indications of this instrument may be *safely* regarded as approximating to within 1,000 lbs. of the true pressure, even for the greatest pressures exerted, and much nearer for the smaller pressures."



We give some of the most interesting results obtained.

PRESSURE PER SQUARE INCH DUE TO PROOF CHARGES IN A 42-POUNDER GUN.

	Pounds.
21 lbs. powder, 2 shot and 1 wad gave a pressure at the bottom of the bore	64,510.
14 lbs. powder, 2 shot and 1 wad gave a pressure at the bottom of the bore	55,622.
21 lbs. powder, 1 shot and 1 wad gave pressure	47,785.

CONSTANT WEIGHT OF PROJECTILE, AND INCREASING CHARGES.

Weight of Charges.	*Pressure per Square Inch. Pounds.*
3	11,319
4	17,483
5	16,983
6	18,811
7	19,551
8	24,146
9	28,972
10	32,638
11	37,463
12	38,961

CONSTANT WEIGHT OF CHARGE WITH INCREASING WEIGHT OF PROJECTILE

Weight of Charge. Pounds.	*Weight of Projectile. Pounds.*	*Pres. Square Inch. Pounds.*
5	35	16,733
5	40	17,563
5	45	24,226
5	50	27,323
5	55	28,632
5	60	34,966
5	65	32,797
5	70	34,886
5	75	36,964
5	80	38,462
5	85	41,120

Table showing the velocity of shot, in feet per second, and pressure of gas per square inch, in pounds, due to equal columns of powder behind equal columns of metal, when fired in guns of different diameter of bore, each result being a mean of ten fires.

Diameter of bore.	Weight of charge.	Weight of shot.	Velocity.	Pressure at different distances from bottom of bore. at bottom.	at 14 in.	at 28 in.	at 42 in.	at 56 in.	at 70 in.	at 84 in.
7	5.13	74,44	904	36,420	15,850	8,370	6,470	6,850	8,050	6,720
9	8.48	124.42	888	67,100	21,100	17,750	14,900	29,475	20,970	22,825
11	12.67	186.03	927	84,750	29,300	27,800	22,420	28,400	33,850	25.050

"The points most worthy of note in these results, are the very marked increase in pressure of gas as the diameter of bore increases; and that the indications of pressure are greater at 56 inches, 70 inches, and 84 inches than at 42 inches, especially in the 9-inch and 11-inch guns. The cause of the difference of pressure developed in these guns of different diameters of bores, is believed to be mainly due to the greater heat developed by the combustion of the larger mass of powder in the large than in the smaller caliber; and perhaps, also, to the different products of combustion formed under this increased temperature and pressure, and partly to the greater cooling surface in proportion to the weight of charge in the smaller than in the larger caliber."

The highest pressure observed in a cannon was 100,000 lbs. to the square inch, but this was greatly exceeded in a shell. A very strong shell was cast; the exterior diameter being 12 inches, and the interior a little less than 4, with an orifice only one-tenth of an inch in diameter, this orifice being the only outlet for the gas. The cavity was filled with powder, which was fired, when the instrument indicated a pressure of 185,000 lbs. to the inch.

The following are some of the conclusions to which Capt. Rodman was led by experiments which we have not space to describe in detail:—

"Time is required for the rupture of any mass of iron, though the rupturing force may be greatly in excess of the resistance of that mass. And in the ordinary discharge of cannon the gun is subjected, at each discharge, to a force which would inevitably burst it, if permitted to act for any appreciable length of time; so that it may be said that cannon do not burst because they have not time to do so before the bursting pressure is relieved."

"Pressure increases in a higher ratio than that of the volume of powder; it being, for the larger charges, almost as the squares of the volumes."

"There is a marked difference in the quantities of gas evolved from equal weights of Hazard's and of Dupont's powder, the latter yielding the greater quantity."

There are many other matters of interest treated of in these valuable reports, and we may refer to them again at another time.

New Silver Alloy.

A beautiful new alloy is stated by foreign contemporaries to have been invented recently, after many experiments, by Messrs. De Ruolz and De Fontenay, France. It is said to be well adapted for small coins and industrial purposes. It consists of one-third silver united with 25 to 30 per cent of nickel, and from 37 to 42 of copper. Phosphorus is used as a flux in making the metals combine, but when first made and cooled it is very brittle. To render it ductile the phosphorus must all be removed by reheating, after which the alloy resembles a simple metal, and presents in a very high degree the qualities to which the precious metals owe their superiority. It resembles platinum and silver of $\frac{800}{1000}$ in color; it takes a very brilliant polish. Its tenacity and hardness are extreme. It is ductile, malleable, and very difficult of fusion; very sonorous, unalterable in the air, and attacked only by the most energetic re-agents. It has no odor, and its specific gravity is but little inferior to that of silver. It is easy to estimate the important part such an alloy is calculated to play in the industrial arts, and especially in the silversmith's art—in, to a great extent, replacing silver, of which its price is 40 per cent less, and as its hardness gives it a marked superiority. Again, articles which are merely silvered or gilt have, it is true, a great advantage in their low price; but they quickly deteriorate, and can be re-silvered or regilt only a very few times, after which they must be replaced by new ones, and, in the long run, entail such an outlay as to confirm the old adage, that "the cheapest is the dearest in the end."

BORAX MINERAL.—Among the minerals found associated with the native copper of Lake Superior is one very hard and white, resembling marble, called "massive datholite," first noticed by Professor T. D. Whitney, in Silliman's *Journal of Science*, in 1859. It contains over 20 per cent of boracic acid, and will therefore prove valuable for the manufacture of borax. Experiments recently made by Dr. Keep, and repeated by Dr. Hays, of Boston, prove that this mineral may even take the place of borax in many most important applications, without any previous chemical change. This might have been inferred from the fact that it contains nearly one-half as much pure borax as is found in the commercial boracic acid.

BOATBUILDING BY MACHINERY BY AN AMERICAN IN LONDON.—A company is about to be started in London for the application of the patents of Mr. Nathan Thompson, an American engineer, for boatbuilding by steam machinery. This machinery is suitable for the construction of boats of every size and mold, and durability and safety are attained from the uniformity and perfection of the various fittings, while the saving of time and labor is extraordinary. A cutter 30 feet in length can, it is said, be constructed and delivered perfect in every respect within a few hours after the order is received for it, and the master shipwright at the Woolwich dockyard, who was appointed by the Admiralty to examine and report on the method, has made a very favorable report to that body.

STOLEN ARMS.—It is gratifying to know that of the arms which the traitor Floyd sent South, but a small portion were rifled, while most of them were the old flint-lock altered over, and these are so much weakened in the procees of alteration, as to become almost as dangerous when discharged to the person at the breech as to the one in front of the muzzle.

© 1861 SCIENTIFIC AMERICAN, INC.

INTERESTING FROM FORT PICKENS AND PENSACOLA.

Mr. Russell, correspondent of the London *Times*, furnishes to that journal the following graphic account of his vist to Pensacola and Fort Pickens. It would seem that Gen. Bragg has been doing justice to his name, as he has boasted of having two or three hundred guns. Mr. Russell says :—

I do not think that any number of words can give a good idea of a long line of detached batteries. I went through them all, and I certainly found stronger reasons than ever for distrusting the extraordinary statements which appeared in the American journals in reference to military matters, particularly on their own side of the question. Instead of hundreds of guns, there are only tens. They are mostly of small caliber, and the gun-carriages are old and unsound, or new and rudely made. There are only five "heavy" guns in all the works, but the mortar batteries, three in number, of which one is unfinished, will prove very damaging, although they will only contain nine or ten mortars. The batteries are all sand-bag or earth works, with the exception of Fort Barrancas. They are made after all sorts of ways, and are of very different degrees of efficiency. In some the magazines will come to speedy destruction; in others they are well made. Some are of the finest white sand, and will blind the gunners or be blown away with shells; others are cramped and hardly traversed; others, again, are very spacious and well constructed. The embrasures are usually made of sand bags, covered with raw hides to save the cotton bags from the effect of the fire from their own guns. I was amused to observe that most of these works had galleries in the rear, generally in connection with the magazine passages, which the constructors called "rat holes" and which are intended as shelter to the men at the guns, in case of shells falling inside the battery. They may prove to have a very different result, and are certainly not so desirable in a military point of view as good traverses. A rush for the "rat hole" will not be very dignified or improving to the *morale* every time a bomb hurtles over them; and assuredly the damage to the magazines will be enormous if the fire from Pickens is accurate and well sustained. Several of the batteries were not finished, and the men who ought to have been working were lying under the shade of trees sleeping or smoking—long-limbed, long-bearded fellows in flannel shirts and slouched hats, uniformless in all save bright well kept arms and resolute purpose. We went along slowly from one battery to the other. I visited nine altogether, not including Fort Barrancas, and there are three others, among which is Fort M'Rae. Perhaps there may be fifty guns of different sorts in position for about three miles along a line extending 135° around Fort Pickens, the average distance being about 1½ miles. The mortar batteries are well placed among brushwood, quite out of view of the Fort, at distances varying from 2,500 to 2,800 yards, and the mortars are generally of calibers corresponding nearly with our 10-inch pieces. Several of the gun batteries are put on the level of the beach; others have more command, and one is particularly well placed close to the White Lighthouse on a raised plateau which dominates the sandy strip that runs out to Fort M'Rae.

The amount of ammunition which I saw did not appear to me to be at all sufficient for one day's moderate firing, and many of the shot were roughly cast and had deep flanges from the molds in their sides, very destructive to the guns as well as to accuracy. In the rear of these batteries, among the pine woods and in deep brush, are three irregular camps, which, to the best of my belief, could not contain more than 2,700 men. There are probably 3,000 in and about the batteries, the Navy Yard and the suburbs, and there are also, I am informed 1500 at Pensacola, but I doubt exceedingly there are as many as 8,000 men all told, of effective strength, under command of Gen. Bragg. It would be a mistake to despise these irregulars. One of the Mississippi regiments out in camp was evidently composed of men who liked campaigning, and who looked as though they would like fighting. They had no particular uniform—the remark will often be made—but they had pugnacious physiognomies and the physical means of carrying their inclinations into effect, and every man of them was, I am informed, familiar with the use of arms.

Fort Pickens has a regular bastioned trace, in outline an oblique and rather narrow parallelogram, with the obtuse angle facing the sea at one side and the land at the other. The acute angle, at which the bastion towards the enemy's batteries is situated, is the weakest part of the work; but it was built for sea defence, as I have already observed, and the trace was prolonged to obtain the greatest amount of fire on the sea approaches. The crest of the parapet is covered with very solid and well made merlons of heavy sand bags, but one face and the gorge of the bastion are exposed to an enfilading fire from Fort M'Rae, which the Colonel said he intended to guard against, if he got time. All the guns seemed in good order, the carriages being well constructed, but they are mostly of what are considered small calibers now-a-days, being 32-pounders, with some 42-pounders and 24-pounders. There are, however, four heavy Columbiads, which command the enemy's works on several points very completely. It struck me that the bastion guns were rather crowded. But, even in its present state, the defensive preparations are most creditable to the officers, who have had only three weeks to do the immense amount of work before us. The brick copings have been removed from the parapets, and strong sand bag traverses have been constructed to cover the gunners, in addition to the "rat holes" at the bastions. More heavy guns are expected, which, with the aid of a few more mortars, will enable the garrison to hold their own against everything but a regular siege on the land side, and, so long as the fleet covers the narrow neck of the island with its guns, it is not possible for the Confederates to effect a lodgment. If Fort M'Rae was strong and heavily armed, it could inflict great damage on Pickens; but it is neither one nor the other, and the United States officers are confident that they will speedily render it quite untenable. The *bouches a feu* of the fort may be put down at 40, including the available pieces in the casemates, which sweep the ditch and the faces of the curtains. The walls are of the hardest brick, of nine feet thickness in many places, and the crest of the parapets, on which the merlons and traverses rest, are of turf. From the walls there is a splendid view of the whole position, and I found my companions were perfectly well acquainted with the strength and *locus* of the greater part of the enemy's works. Of course I held my peace, but I was amused at their accuracy. "There are the quarters of our friend, General Bragg." "There is one of their best batteries just beside the lighthouse." The tall chimney of the Warrington Navy Yard was smoking away lustily. The Colonel called my attention to it. "Do you see that, sir? They are casting shot there. The sole reason for their 'forbearance' is that Navy Yard. They know full well that if they open a gun upon us we will lay that yard and all the work in ruins." Captain Vogdes subsequently expressed some uneasiness on a point as to which I could have relieved his mind very effectually. He had seen something which led him to apprehend that the Confederates had a strong entrenched camp in rear of their works. Thereupon I was enabled to perceive that in Captain Vogdes' mind there was a strong intention to land and carry the enemy's position. Why, otherwise, did you care about an entrenched camp, most excellent engineer? But now I may tell you that there is no entrenched camp at all, and that your valiant eye, sir, merely detected certain very absurd little furrows which the Confederates have in some places thrown up in the soft sand in front of their camps which would cover a man up to the knee or stomach, and are quite useless as a breastwork. If they thought a landing probable, it is unpardonable in them to neglect such a protection. Their furrows are quite straight, and even if they are deepened, the assailants have merely to march round them, as they extend only for some 40 or 50 yards, and have no flanks. The officers of the garrison are aware the enemy have no mortar batteries, but they think the inside of the fort will not be easily hit, and they said nothing to show that they were acquainted with the position of the mortars.

From the parapet we descended by a staircase into the casemates. The Confederates are greatly deceived in their expectation that the United States' soldiers will be much exposed to sun or heat in Fort Pickens. More airy, well-ventilated quarters cannot be imagined, and there is quite light enough to enable the men to read in most of them. The plague of flies will infest both armies, and is the curse of every camp in summer. As to mosquitoes, the Confederates will probably suffer, if not more, at least as much as the Federal troops. The effect of other tormentors, such as yellow fever and dysentery, will be in all probability impartially felt on both sides; but, unless the position of the fort is peculiarly unhealthy, the men, who are under no control in respect to their libations, will probably suffer more than those who are restrained by discipline, and restricted to a regular allowance. Water can always be had by digging, and it is fit for use if drunk immediately. Vegetables and fresh provisions are not of course so easily had as on shore, but there is a scarcity of them in both camps, and the supplies from the storeships are very good and certain. The bread baked by the garrison is excellent, as I had an opportunity of ascertaining, for I carried off two loaves from the bakehouse on board our schooner. Our walk through the casemates was very interesting. They were crowded with men, most of whom were reading. They were quiet, orderly-looking soldiers—a mixture of old and young—scarcely equal in stature to their opponents, but more to be depended upon, I should think, in a long struggle. Everything seemed well arranged. Those men who were in their beds had mosquito curtains drawn, were reading or sleeping at their ease. In the casemates used as an hospital there were only some twelve men sick out of the whole garrison, and I was much struck by the absence of any foul smell and by the cleanliness and neatness of all the arrangements. The Colonel spoke to each of the men kindly, and they appeared glad to see him. The dispensary was as neat as care and elbow grease could make it, and next door to it, in strange juxtaposition, was the laboratory of the manufactory of fuses and deadly instruments, in equally good order. Everything is ready for immediate service. I am inclined to think it will be some time before it is wanted. Assuredly, if the enemy attack Fort Pickens, they will meet with a resistance which will probably end in the entire destruction of the Navy Yard and of the greater part of their works. A week's delay will enable Col. Brown to make good some grave defects; but delay is of more advantage to his enemy than to him, and if Fort Pickens were made at once the *point d'appui* for a vigorous offensive movement by the fleet and by a land force, I have very little doubt in my mind that Pensacola must fall, and that Gen. Bragg would be obliged to retire. In a few weeks the attitude of affairs may be very different. The railroad is open to Gen. Bragg, and he can place himself in a very much stronger attitude than he now occupies.

How French Army Shoes are Made.

A correspondent of the New York *Evening Post* gives an interesting account of the manner in which the shoes are made for the French army. He says:—

One of the most curious circumstances in the manufacture of these shoes is the supervision exercised by the government at every stage of the work.

The manufacturer buys the leather, after being certain that it is not tanned by means of acids. He cuts the article, rejects the bellies and the necks, and employs exclusively that which is called the "hearts." A machine armed with hammers beats the skins, which are then cut. When beaten, they are examined, piece by piece, by experienced shoemakers and tanners named by the War Department, who reject all which appear doubtful. The maker receives from the hands of these experts the leather which they pronounce good, and cuts it mechanically. There are twenty-two pieces in each pair of shoes. Each of these, great or small, is examined separately by another expert, a sworn verifyer, who accepts it on his own responsibility and by his signature. These pieces are then carefully examined, one by one, by a Military Board consisting of three captains, who mark with a stamp their rejection or acceptance. The parts are then reunited as they should go together; they are placed on the lasts (there are 40,000 pairs of lasts in the establishment), they are fitted, they are sewed. Each shoe passes through fifteen hands before it is finished, after which it is examined and received by a sworn expert, who affixes a ticket with his name, and it is examined in the last instance, without appeal, by a Military Commission composed of a commandant and three captains, stamped for acceptance if all right, or for rejection if a single nail is wanting, or if the awl and wax thread do not show a certain number of points in the sole in the distance of two centimetres.

I only speak from memory of the superior commission who regularly inspect the workshops. A general of division, a commissary and two administrative officers exercise a daily control over the operations of the high-shoe shop. It is thus absolutely impossible that a shoe can pass from the factory deficient in the quality or material, or in the character of the finish. The thread, the nails, the wax, the paste, all are chosen, verified and submitted to the control of the Department of War.

A pair of shoes manufactured in this way, in the new factory, costs eight francs; in the army shops, six francs.

France has a central workshop which places the clothing, shoes, and even the encampment of the soldier, under the hand and eye of the Minister of War. In a few years the companies employed in this work hitherto can either be suppressed or employed in the repairs of military effects. But is there not some danger in this concentration of all the resources of the army at a single point? What if the workmen should strike, or a fire should destroy the factory, or the contractor should fail through some unfortunate speculation? The first is not deemed serious, for the workmen are patriotic, and the 1,100 workmen employed in the manufacture are not, properly speaking, shoemakers. The work is so divided among them that few learn but a single branch of the business, and would suffer if they should desert the factory. The Minister could also organize military workshops in such a case. There is no danger of fire, for the buildings are fireproof. Should the contractor fail, the government could take the establishment and give it over to the care of another.

Much of the work is done by steam machinery, and this is the only fault of the institution; the soldiers disdain a machine-made shoe, but they will soon get cured of this idea.

Feeding Horses.

The London Omnibus Company have lately made a report on feeding horses, which discloses some interesting information, not only to farmers, but to every owner of a horse. As a great number of horses are now used in the army for cavalry, artillery and draught purposes, the facts stated are of great value at the present time.

The London company uses no less than 6,000 horses; 3,000 of this number had for their feed bruised oats and cut hay and straw, and the other 3,000 got whole oats and hay. The allowance accorded to the first was: bruised oats, 16 lbs.; cut hay, 7½ lbs.; cut straw, 2⅛ lbs. The allowance accorded to the second: unbruised oats, 19 lbs.; uncut hay, 13 lbs. The bruised oats, cut hay and cut straw amounted to 26 lbs.; and the unbruised oats, &c., to 32 lbs. The horse which had bruised oats, with cut hay and straw, and consumed 26 lbs. per day, could do the same work as well, and was kept in as good condition, as the horse which received 32 lbs. per day. Here was a saving of 6 lbs. per day on the feeding of each horse receiving bruised oats, cut hay and cut straw. The advantage of bruised oats and cut hay over unbruised oats and uncut hay is estimated at five cents per day on each horse, amounting to $300 per day for the company's 6,000 horses. It is by no means an unimportant result with which this experiment has supplied us. To the farmer who expends a large sum in the support of horse-power, there are two points this experiment clearly establishes which, in practice, must be profitable: first, the saving of food to the amount of 6 lbs. per day; and, second, no loss of horse-power arising from that saving.

California Academy of Sciences---Coal.

We learn from the *Mining and Scientific Press* (Cal.) that a meeting of the members of the above institution was held in San Francisco on the 15th of May, at which Professor Blake gave an interesting description of the coal regions of Monte Diabola, accompanied with specimens of the coal. The veins are rather thin, but the coal is good bituminous. The fossils of the region belong to the tertiary formations.

Professor Whitney is of opinion that the coal was formed from accumulations carried by eddies, and deposited in still water.

A considerable quantity of this coal has been taken to San Francisco, and it has tended to reduce the price of wood and the foreign coal. A plentiful supply of coal in California would tend greatly to facilitate quartz-mining, by enabling the machinery to be operated by cheap steam power. Coal will also make California a great manufacturing State.

A Job.—Messrs. Woodruff & Beach, of Hartford, Conn., have taken a contract for the engine and machinery of the seven sloops of war ordered by Congress, to be precisely similar to the engine and machinery of the *Mohican*, and to be delivered at Kittery, Maine, in four months from date. The work will be pushed forward rapidly.

© 1861 SCIENTIFIC AMERICAN, INC.

Self-Acting Car Coupler and Improved Bumper.

It is probable that there is not one of our readers who has not shuddered at seeing brakemen expose their lives or limbs in the dangerous operation of coupling cars together, and it is certainly surprising that the introduction of a practical self-operating coupling has not been before adopted. We now, however, have the satisfaction of illustrating one invented by A. Stroh, of Port Jervis, in this State, which has been in use for several months on the Central Railroad, and is said to be free from all objections previously experienced in self-acting couplings, and to work in the most satisfactory manner in every respect.

Fig. 1 of the engraving is a perspective view, and Fig. 2 a longitudinal section. No springs are employed; the moving parts operating entirely by gravity. The coupling bolt, *a*, is held suspended to admit the entrance of the link, *b*, by the inclined latch, *c*, this latch being kept in position by two pins which pass through the elongated slat in it, as shown. It will be seen that, as the link enters the bumper head, it pushes the latch backward and upward out of the way, allowing the bolt to fall through the link and secure it in place. When the bolt is drawn out to uncouple the cars, the latch slides down by its own gravity, being guided forward by the pins under the bolt, so as to support the latter until the latch is again removed.

This arrangement is so exceedingly simple, and so certain in its operation, that it is difficult to conceive of any objections being developed by its future use.

Mr. Stroh has also devised, in combination with this self-operating coupling, an improved spring bumper for cars. The two plates, *d d*, Fig. 1, are secured to the longitudinal timbers of the car, and the cylinder, *e*, is held between them by trunnions, which arrangement enables the outer end of the bumper to be raised or lowered so as to meet the adjoining car. The rod, *f*, is secured to the cylinder, *g*, by a head, and to the short piston, *h*, by a nut and screw, as shown. The india-rubber springs, *i* and *j*, being retained securely in the cylinder, *e*, are not only thus perfectly protected from rain and dust, but, by being thus confined, are more efficient; so that a much smaller quantity of this expensive substance serves the purpose. The cylinder, *k*, is introduced between the cylinders, *e* and *g*, for the purpose of adjusting the length of the bumper to that required in the place in which it is to be used.

The patent for this invention was procured, through the Scientific American Patent Agency, June 11, 1861, and further information in relation to it may be had by addressing the assignees, Stroh, Swinton & Van Etter, at Port Jervis, N. Y.

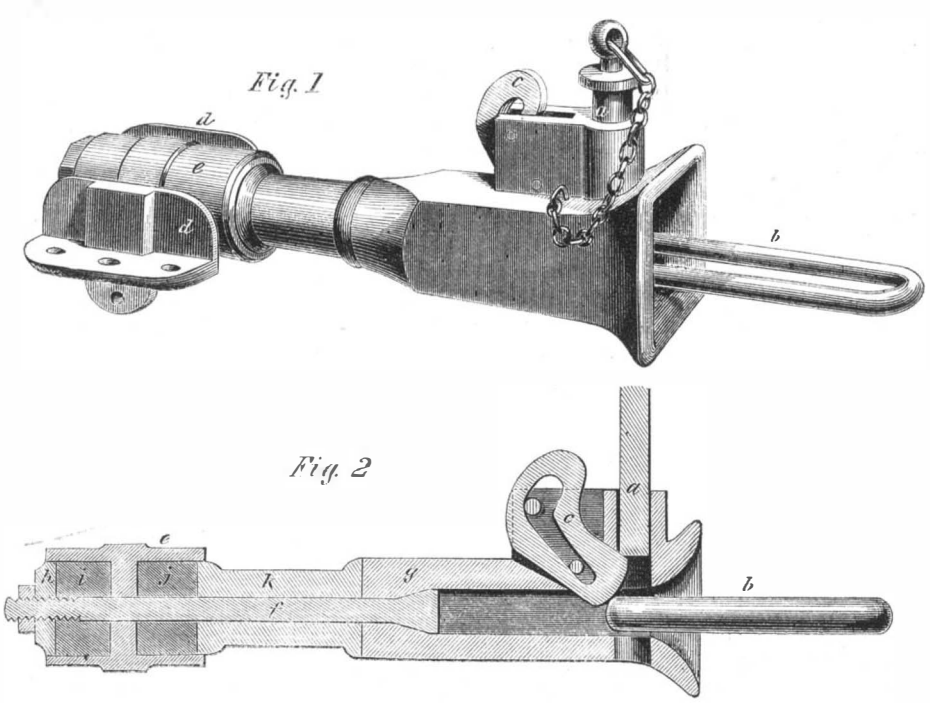
Electro-Chemical Colorin .

A new art of coloring plates of metal by electricity was described at a late meeting of the French Academy of Sciences by M. Becquerel. This *savant* commenced his experiments upon the electro-chemical coloring of metals in 1843. His object was to deposit upon plates of gold, silver and copper uniform layers of the oxyd of lead, which, according to the duration of the operation, produces beautiful colors. He placed in an alkaline solution of the protoxyde of lead the plate of metal to be colored, putting it in connection with the positive pole of the battery. He then closed the circuit by a platinum wire connecting it with the negative pole. The protoxyde of lead is deposited upon the surface of the plate to be colored in layers of great beauty. With a little practice, M. Becquerel was able to produce all the different shades of colors which he desired—painting, as it were, the different parts with various hues. It has been very difficult to render such colors permanent, but this has at last been accomplished, and M. Becquerel exhibited several samples of these to the members of the Academy.

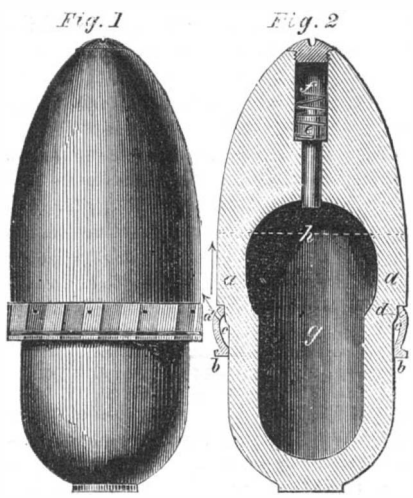
COCHRAN'S IMPROVED PROJECTILE.

On page 360 of the current volume we illustrated a shot with an expanding ring for rifled cannon, the invention of J. W. Cochran, of this city. Mr. Cochran, having made some slight modifications in his projectile, we give an illustration of them; the great importance of rifled ordnance at the present time rendering all inventions in this department of commanding interest.

The principal modification made in this projectile



STROH'S CAR COUPLING AND BUMPER.



since our last illustration is in the position of the cavity when used as a shell. The cavity is brought back in rear of the ring, as shown in Fig. 2, thus carrying the center of gravity, *h*, forward of the center of bulk, which will necessarily keep the point of the shot directly forward in its flight. The present illustration shows the ring carried farther forward on the shot than the previous one, it being manifest that it may be placed around the shot in any part. Mr. Cochran says, however, that practice shows the proper place to be very near the rear of the shot, as represented on page 360. The expanding ring has great advantage in a breech-loading cannon, as the bore does not require to be chambered larger than the caliber; this being necessary when solid bands are used, as in the Armstrong gun, and other ordnance of like construction. This principle of expansion is equally applicable to small arms.

The ring, *b*, is made of copper or other malleable metal of the curved form shown, the space, *c*, between it, and the shot being filled with tallow or other suitable lubricating material; the holes, *d d*, being provided for the escape of the tallow as the ring is compressed by the force of the gases resulting from the combustion of the powder. The shell may be exploded in any of the approved modes; the cut representing one of the best plans yet devised. A heavy cylinder, *e*, with a small hole through its axis, has a percussion cap upon its forward end, and when the motion of the shell is suddenly checked by striking any solid substance, the cylinder, *e*, is carried forward by its own velocity, striking the cap upon its forward end against the wall of the shell, exploding the cap. The flame communicates through the hole in the axis of the cylinder with the powder in the cavity, *g*, thus exploding the shell. The spiral spring, *f*, holds the cylinder from being thrown forward by a slight force resulting from accidental dropping of the shell.

Fig. 1 shows the appearance of the projectile after it has been discharged, the expanding ring completely filling the riflings of the piece. If this ring is made of copper or brass, it will be impossible for either the whole or fragments of it to fly off, and as it adds but one piece of metal to the cast-iron shot, it forms one of the most simple, if not the simplest and best projectiles yet devised for rifled cannon. We commend it to a thorough examination by our military authorities.

Further information in relation to it may be obtained by addressing the inventor at 160 Broadway, New York.

ENAMELED STEEL SHIRT FRONTS AND COLLARS.—The cottony Manchester and the steely Sheffield are at cross purposes. In the Manchester starchy laundry they are "getting up" shirt fronts, collars and wristbands, of "enamelled steel!" while at Sheffield cotton or linen shoddy is about to be manufactured on a great scale, in shape of shirt collars, fronts, and other fragments of piecemeal attire, in a large building now in course of erection on an eligible stream there. The great Manchester house who have sent forth their business announcement, anent the steel manufacture, describe it as assuming the shapes of "elastic steel shirt collars, wristbands, and fronts, enameled white." The gentlemen in steel wristbands and collars, we should fear, will feel much as if they were serving apprenticeships to the great Newgate house, in the oakum line. But custom is everything, as the cook said to the eels. —*London Builder.*

A NEW breech-loading cannon, invented by Professor A. K. Eaton, of this city, was experimented with on the beach at Long Branch, N. J., on the 27th ult. The breech is closed by a steel wedge which is operated by levers. The charge is placed in a steel cartridge case, so arranged in the gun that the powder nearest the ball is ignited first. With a charge of 12 ounces of powder, and an elevation of 5°, the range of a 5-pound conical shot was 2,145 yards; at an elevation of 10°, the range was 4,000 yards.

FLOATING BATTERIES.—At the Washington Navy Yard two large scows are to be immediately built, each capable of mounting eight 32-pounders, with moveable barricades, for the protection of the troops thereon.

THE TELEGRAPH TO THE PACIFIC.—A train of twenty-five wagons, 228 oxen, eighteen mules and horses, and fifty men, left Sacramento on the 27th of May, with materials to make a line of telegraph from Fort Churchill to Salt Lake City—a distance of 500 miles. They hope to have it done by the 1st of December, and by that time the line from the Mississippi to Salt Lake will be finished.

A GREAT COMET.—A large and brilliant comet suddenly made its appearance in the northwest portion of the heavens on Sunday evening, June 30th.

© 1861 SCIENTIFIC AMERICAN, INC.

Scientific American

MUNN & COMPANY, Editors and Proprietors.

PUBLISHED WEEKLY
At No. 37 Park-row (Park Building), New York.

O. D. MUNN, S. H. WALES, A. E. BEACH.

TERMS—Two Dollars per annum.—One Dollar in advance, and the remainder in six months.
Single copies of the paper are on sale at the office of publication, and at all the periodical stores in the United States and Canada.
Sampson Low, Son & Co., the American Booksellers, No. 47 Ludgate Hill, London, England, are the British Agents to receive subscriptions for the SCIENTIFIC AMERICAN.
☞ See Prospectus on last page. No traveling agents employed.

VOL. V. NO 2....[NEW SERIES.]....*Seventeenth Year.*

NEW YORK, SATURDAY, JULY 13, 1861.

RAISING MONEY FOR THE WAR.

If a farmer who is not able to buy a horse, and is consequently cultivating his land with a spade, can succeed in hiring a horse and plow from one of his neighbors, he can by their means raise a much larger crop, and can therefore well afford to pay the owner for their use. Or if he hires money to buy a horse and plow with, he can, from the larger product of his farm, afford to pay interest for the use of the money.

In the same way, a manufacturer who hires money and invests it in machinery is, by the larger amount of commodities which he can manufacture, enabled to pay the interest on the money, and still have an additional profit left to himself.

The men who live on the interest of their capital employed in industrial operations are no burdens upon the community. The use of their capital increases the product of wealth in the country to an amount greater than the income which they derive from it. They contribute more than any other class to the increase of the national wealth.

But when a government hires capital and consumes it in war, this capital ceases to aid in the production of wealth, and the interest that is paid for its use is drawn from the pockets of the industrial classes, diminishing by just that amount the sum which they can use for their own comfort and pleasure. A national debt is a simple burden, whether owed to citizens or foreigners. Almost every nation in Europe is supporting in idleness a great army of fundholders, by taxes wrung from the producing classes.

Such is the effect of a national debt after it is formed; the process of its formation is not less injurious. The means of carrying on this war must be supplied by the community, and it is easier to furnish it in taxes than by the way of loans. The great mass of our business men and a very large portion of our farmers are in debt. If the capitalists to whom these debts are due, change their investments to government stocks, they must collect the debts. If a farmer, manufacturer or merchant has his active capital taken away from him, it embarrasses his operations very seriously. It is better for him to pay a large portion of his profits in taxes than to find it impossible to renew his loans. The former simply diminishes his income, the latter frequently causes his bankruptcy.

Nearly all intelligent English writers now regard it as a matter of regret that the funds for their great wars were not raised by taxation instead of by loans. The *Westminster Review* says that it would have been done had the statesmen of the times understood the subject of political economy.

THE NEW GUNBOATS.

Specifications have been published, and numerous estimates given in, for building a large number of new steam gunboats. We regret that the contracts have been delayed for so many weeks after the estimates have been tendered by most of our shipbuilders. Much valuable time has thus been lost. We believe the business could have been completed in as many days as it has taken the naval authorities weeks to consider.

It is intended that the engines of these vessels shall be very simple, compact and well-made. They are not to be fitted for the expansive working of steam, although they are to have the Stevens cut-off. We understand that several engineers and engine builders in this city intend to institute another series of experiments to test the relative economy in working steam full stroke and expansively, as they do not believe the "Erie experiments" were conclusive on the subject. This movement has been influenced by the designs presented for the engines of the new gunboats.

These vessels are intended to draw but little water, so as to run into shoal bays and rivers. The length of each will be 158 feet; extreme breadth, 28 feet; depth of hold, 12 feet. The framing is to be of the best white oak. The rig will be that of a three-masted schooner, and each will carry six 32-pounders and one pivot gun on each side, beside a light rifle gun on the forecastle deck as a chaser.

Each boat will have two horizontal engines, of 30 inches bore and 18 inches stroke. Sewall's surface condensers will be used, and each engine will be arranged so as to operate independently, when so required. The boilers are to be two in number—Martin's patent—having vertical water tubes connecting the upper and lower water spaces. Each will have 88 square feet of grate surface, and 2,700 square feet of tubular and flat heating surface. The pressure of steam designed to be carried is 30 lbs. on the square inch. A donkey engine will be used for pumping and driving a Dimpfel blower for the furnaces. A four-bladed screw will be employed as the propeller.

It is contemplated that, when fully manned and all ready for active service, each gunboat will only draw about 10 feet of water, and will run at a speed of from 12 to 15 knots per hour. If these vessels realize such a speed, they will prove to be most effective cruisers. No privateer or smuggler craft whatever will be able to escape them. It is desirable that they should be finished in about four months, at the farthest; but we much doubt if this is possible. We trust that the contracts will be given to parties who will put in the best of material, and employ the best skill to make these vessels unrivaled. Too many of our government contracts for machinery have usually been given to parties through favor; hence, the engines and boilers of several steam frigates have not been of a superior character; they have been subject to frequent breakage.

The shaft of the propeller screw, we understand by the specification, is to be only 7 inches. This appears to be very small, as it has been considered by engineers that a 9-inch shaft is barely sufficient for engines of 30-inch cylinders. When the shaft of a propeller breaks, the vessel becomes almost helpless. Two blades of a screw may be broken, and the boat may still make tolerable speed; but when the shaft breaks, all the means of propulsion are upset. It is wise, therefore, to make a screwshaft rather large than small. We are very partial to those engineering "errors" which are on the "safe side."

The machinery of the new gunboats should be as good as skill and material can make it, so as to be entirely reliable in the most critical moments. The Chief Engineer of the Navy has examined the English gunboats; he knows their good and bad points, and we understand that his designs, if carried out, will make the engines of the new gunboats superior to those in the British navy.

IRON-CLAD FRIGATES AGAIN.

We would again call the attention of those in authority at Washington—and those members who are about deliberating on the affairs of the nation in the extra session of Congress—to the necessity of making provision for building several new iron-clad frigates and gun boats, or plating some of our best steam frigates that are now in service. As it regards the covering of several of our present frigates with coats of mail, contracts might be made for this purpose, and the plates may be preparing while the vessels are actively employed up to the very day when they are required to be docked to have the plates put on. By pursuing such a course as this, much time would be saved. Perhaps the best method of obtaining a mail-clad fleet is simply to cover common wooden-built war vessels with thick iron plates. *La Gloire*, the celebrated French frigate, is built in this manner, and as she has been fairly tested; it is not a mere subject of experiment, but a practical fact.

The new gun boats for the American navy, for which proposals have been given out, should be iron-plated in their most vulnerable parts, so as to be shell-proof. If they are not to be protected in this manner, they will not realize the benefits anticipated from them. They are intended to run into shoal waters—bays and creeks—where they will be exposed to batteries on shore at short range, and from which shells may be effectually used against them. They will therefore require to be shell-proof, or they will not be reliable, according to modern shell practice.

In England, there is a great variety of opinion respecting the best modes of building mailed ships—whether they should be constructed entirely of iron, or of iron and wood combined, or whether wood should be the main frame-work, or merely a lining for the iron plates to be fastened upon. There are seven new iron-plated frigates building at nearly as many English and Scotch dockyards; these have timber linings for the iron—the metal being the main material of the vessels. The *Warrior*, which was the first for which a contract was made with Penn & Sons, of London, seems to have been a costly experiment thus far. It is not yet half finished, while the *Black Prince*, its consort, building by R. Napier, of Glasgow, will be ready for sea in the course of three or four weeks. The plans of the *Warrior* have been altered several times, and now the government naval authorities are not sure but they have made a grand mistake in building such vessels, as they have come to the conclusion not to enter upon the construction of any more at present, but to lengthen several of their line-of-battle wooden ships and cover them with iron plating. Louis Napoleon has been most active in building such vessels. Admiral Elliott, of the British Navy, states that he lately saw 12 iron-cased frigates larger than *La Gloire* in the French dockyards; also two line-of-battle ships pierced for 100 guns each. The French force in armor-clad vessels, is now 24 frigates of the first class.

These facts deserve attention, inasmuch as they show us how much we are behind other naval powers We have not a single iron-plated gun boat or other vessel in our navy, and no measures have yet been taken for the construction of one, although their utility has been endorsed by our most able naval officers. Such vessels are costly, it is true, but we shall find it a more costly affair to prolong a struggle with insufficient agencies, than to adopt the most effective measures—although the most expensive at first—to make a complete and speedy settlement of our troubles. Iron-clad vessels can run past forts without much danger, and they can also attack forts and land batteries almost with impunity. For the sake of our commerce, and our treaties with other nations, we are bound to re-establish the authority of our government, and open our ports that are now blockaded within a reasonable period. If we had three iron-cased frigates of light draft (18 feet) now, they could open the trade of the Mississippi, collect dues at New Orleans, compel submission to the laws, and make peace with power to preserve it.

RAILROAD IMPROVEMENTS.—The Directors of the N. Y. Central Railroad have commenced the construction of a new bridge over the Tonawanda Creek, at Batavia. The Batavia *Times* states that the new structure will be a wrought-iron, trussed girder bridge of one hundred and twenty-four feet span, embracing the double track between two girders. The trusses consist of frames stiffened and strengthened by lattice work, and when viewed in sections as they now lie in a detached and bulky form, impress us favorably as to their capacity of sustaining an immense strain. The total weight of iron used in its manufacture is 205 tuns, and the bridge is capable of sustaining a weight of about twelve hundred and fifty tuns, a strain five times greater than can be brought to bear upon it by any passing train.

COTTON IN INDIA.—Accounts from India state that England is building railroads into the interior, so that the cotton crop, very soon, can be moved as fast as it is produced to the sea shore; and the ship canal across the Isthmus of Suez, from the red sea to the Mediterranean, shortening the distance 6,000 miles, will be finished in twelve months. It is said that if the American troubles continue five years, India will export 4,000,000 bales, rather a large figure, but there is no doubt that great efforts will be made in that country to supply the English manufacturers independent of the United States.

© 1861 SCIENTIFIC AMERICAN, INC.

STEAM WAGONS FOR MILITARY PURPOSES.

In a communication to the *Railway Review*, Mr. J. F. Holloway, of Cuyahoga Falls, Ohio, describes a steam wagon, which appears to have some important improvements for traveling on common roads. He says :—"I use a single driving wheel, which extends across the after end of the machine, and externally is not unlike that used by Mr. Fawkes. The external arrangement, however, is different. The drum consists of an outer and inner shell, there being from 12 to 16 inches space between them. This space, being enclosed at the ends, serves the double purpose of a water tank and heater, and to some extent that of a condenser connected to the exhaust pipe of one or both cylinders, and also to the eduction pipe of the feed pump, or to an 'ejector.' By this arrangement the entire weight is brought low towards the ground. . . . . The water in the tank remains stationary in the bottom of the annular space while the drum revolves. Within this drum the boiler is also placed, and has within the fire box, combustion chamber and return flues. . . . . The drum, boiler, and water tank are all in the best position to give adhesion, a low center of gravity, and freedom from friction."

Mr. Holloway also suggests the application of steam wagons for military purposes. He says :—"It is to be hoped that the unreliability of railroads in or near an enemy's country, as a means of military transit, as shown by recent events at Harper's Ferry and Baltimore will serve as an inducement to the engineering talent of our country to conceive, and perfect some plan of a traction engine that may, in time of war, be used to transport troops and supplies on the common roads, and which may also be used in peace times in the cultivation of millions of acres of land now lying idle in the West."

These sensible suggestions should arrest the attention of all our inventors.

RAILWAY ACCIDENTS.

The last number of the *North British Review* contains a laborious article on this subject in relation to British railways. What social changes have taken place since the days of the stage coach and the canal packet! The speed of five miles per hour was exhilarating in those days; now travelers would die of *ennui* if subjected to less than from 20 to 40 miles per hour. And yet with this great increase of speed in traveling, life appears to be more safe than ever. This is especially so on the other side of the Atlantic. The number of miles of English railroads now open is 9,506. For eight years past, only one person has been killed out of every 6,480,013 passengers carried, and one injured out of 325,222 carried.

Various causes for accidents are set forth. One is defective permanent way (track), rails frequently laminate, split, and fracture. Very heavy locomotives are now used on all the British railways; these try the rails severely, more especially as the speed is very high, being usually from 30 to 45 miles per hour. The way of testing the strength of rails is by permitting a heavy weight to fall upon them from a hight of sixteen feet. This method is better fitted to discover defects than by subjecting them to gradual pressure. Several self-acting switches have been introduced, but careful railroad inspectors have denounced them, a number of accidents having resulted from their use. Careful personal inspection of the switches is advocated. The surface of rails have been covered with steel in several instances; this has increased their durability.

So excellent are the arrangements on some of the English railroads, such as the London and Northwestern, that of 7,900,000 passengers carried in 1851, only one was killed, and this accident was caused by positive gross disobedience of orders.

Captain Huish has published a table entitled "Analysis of One Thousand Cases of Engine Failures and Defects on the London and Northwestern and Subsidiary Railway, the Stock Engines being 587." There were 157 had tubes burst, 92 had springs broken, 89 broken valve-spindles, 77 broken pumps, 40 broken piston rods, 13 broken cranks, 13 broken reversing levers. Most of these breaks were due to defective metal and imperfect forging on these engines. Continuous brakes are recommended, because they can all be applied at once by the engineer. A great many experiments have been made with different brakes, and it has been found that a train of 12 cars may be stopped within a space equal to the length of the train. It has also been determined that a conductor situated on the back of the twelfth carriage of a train frequently could not hear the whistle of a locomotive in front, so that a whistle is not a reliable signal. A bell is said to be more distinct and superior as a sound signal. Many persons entertain a different opinion, but both are used on American locomotives, so that we are doubly insured.

AMERICA AT THE WORLD'S FAIR IN 1861.

Efficient measures have been taken, and extensive preparations are now in progress for holding the next World's Fair in London, on the same site nearly as the one held in 1851. No less than £408,000 have already been subscribed by manufacturers and others for conducting it, and the Bank of England has agreed to make an advance sufficient to defray the necessary expenses of the entire preparations.

Her Majesty's commissioners have fixed upon the 1st of May, 1862, as the day of opening, and the people of all nations are invited to become exhibitors. The question very naturally arises, "What part shall America play in this great international exhibition?" Our present rebellion troubles, and the mighty issues involved in the struggle, are questions of such vast importance, that all others sink into insignificance. It cannot therefore be expected that our agriculturists, mechanics and manufacturers can take such an interest or part in the next World's Fair as they did in the last one, and for this very reason we require to be represented in London by the most able and respectable persons our country can furnish.

We were *mis*represented at the last London Fair by a chief commissioner unqualified for the duties. It was an appointment not fit to be made, and it did the country incredible injury. Such a blunder ought not be committed again, unless it is desirable to bring our country once more into disgrace. This is the point to which we wish to direct the attention of the President and Secretary of State. A United States commissioner for the World's Fair ought to be appointed at an early date, because the Queen's commissioners will not communicate with exhibitors but through those who are appointed by the central authority. It is therefore necessary that the appointment of a competent person as chief commissioner should be made at an early date, so as to give all necessary information to those who intend to be exhibitors.

It is well known to the American exhibitors at the last World's Fair that B. P. Johnson, Esq., Secretary of the New York State Agricultural Society, did our country great credit as State Commissioner in 1851. He has a perfect knowledge of all the duties to fill such a situation, as he has superintended all the New York Annual Fairs for the past twenty years. We suggest his name, as the right man for the right place.

All the articles to be exhibited must have been produced since 1850. None but the best specimens should be permitted to be sent. We can make a most respectable appearance in London if proper measures are taken in due season to encourage exhibitors, and facilitate the transmission of articles.

We are unrivaled in the manufacture of several classes of articles, complete specimens of which should be exhibited. American implements of agriculture, light carriages, sewing and knitting machines, all classes of machines for working in wood, printing presses, book folders, binding machines, steam fire-engines, rotary pumps, rope machines, locks and safes should be exhibited. We should also exhibit our natural products of farinaceous substances—wheat, corn, &c.; our leather, wood, and all other peculiar products.

The government ought to give encouragement to those who desire to offer articles for exhibition, as through the medium of international fairs we are able to exhibit to the world our peculiar products, and thus open the way to their introduction.

VERY extensive lead diggings have lately been discovered and profitably worked at Wetherels Mill, Bucks county, Pa. The ore contains about 60 per cent of the metal. The supply appears to be almost inexhaustible.

IRON SHIPS NOT INVULNERABLE.

The progress of the art of gunnery is so rapid that it is difficult to keep pace with it. It is but a short time since the whole world seemed to have come to the conclusion that a coating of 4½-inch iron plates rendered ships practically invulnerable to cannon shot; but the increase in the size of rifled cannon is disturbing if it does not overthrow this conclusion. *Mitchell's Steam Shipping Journal*, of London, says that in some recent trials at Shoeburyness, one of Sir W. Armstrong's 120-pounders was tried against a 10-inch plate. The target consisted of a solid mass of iron, dovetailed on Thorneycroft's system, backed with massive timber and braced with iron bars. The 68-pounder made no impression on this bulk, but when it was submitted to an Armstrong projectile of 126 lbs. the destruction was instantaneous. The first shot, at a range of 600 yards, cleaned out one of the 10-inch plates, at the same time carrying away the back support. The next gun fired was one of the ordinary 100-pounder Armstrongs, with a solid projectile weighing 110 lbs. The battery was struck in another part, and a breach was made clean through the structure, the fabric itself being so weakened as to insure destruction. The third shot, with the same weight of projectile, was directed against another part of the battery, and the result was conclusive, as the whole fabric of the battery (already weakened) came down above the point that was struck.

It will be remembered that Major Barnard, Capt. Rodman and other officers of our army, have been steadily of opinion that no vessel, however thickly plated, could resist the crushing effect of the 400-pounders which they were endeavoring to introduce into our sea-coast fortifications.

If Capt. Rodman's 12-inch rifled cannon should prove successful, and we have the greatest confidence that it will, it will probably be more formidable to vessels than any other piece of ordnance that has ever been constructed. If the forts around this harbor were armed with this gun, they would probably be able to crush any iron-clad ships that should attempt to pass them, like so many egg shells.

MAKING STEEL RIFLED CANNON.

Messrs. Carpenter & Plass, corner of Twenty-ninth street and First avenue, in this city, are manufacturing rifled cannon from the puddled steel which is made at Troy, in this State. The masses of steel are first heated and subjected to a vigorous pounding under a powerful steam hammer, and are then turned, bored and rifled. One gun has been finished weighing about 700 lbs., and of the following dimensions :—Length, 4 ft. 4 in.; length of caliber, 3 ft. 6 in.; diameter of bore, 2 6-10 in.; external diameter at breech, 10 in.; external diameter at muzzle, 5½ in. It is rifled with eight grooves 1-16th of an inch in depth, and just twice the width of the lands between them; the grooves being 5-8ths of an inch in width, and the lands 5-16ths. The grooves pass half round the caliber in the course of its length, with an increasing twist. They are of the same depth throughout, in other words, their bottoms are curves concentric with the axis of the gun. The manufacturers say that, with the construction of rifling machines, &c., this first gun has cost them about $3,000. They have others in process of manufacture, one of much larger dimensions. The proper machinery for their manufacture being constructed, the cost of these guns will be abont one dollar per pound. That of bronze guns is 70 cents. The great strength and durability are the qualities relied on to offset this greater cost. The quality of artillery is far more important than its expense.

In regard to the danger of flaws, which would naturally be apprehended in this material, Messrs. Carpenter & Plass say that the heating and hammering to which they subject the steel, render it perfectly homogeneous, and that this is proved by the strength of their finished gun, which has been subjected to the most thorough trial with proof charges. We wish this patriotic firm the most complete success in their bold enterprise.

CAPT. JAMES H. WARD, U. S. N., who commanded the gun-boat *Freeborn*, and was lately killed at Matthias Point, was the author of a practical treatise on naval gunnery, a history of naval tactics, and the simple but useful treatise, "Steam for the Million."

© 1861 SCIENTIFIC AMERICAN, INC.

SOLDIER-HEALTH.

A little volume, containing some very useful information on the above subject, has just been issued by Dr. W. W. Hall, of this city. Its chief object is stated to be the prevention rather than the treatment of disease. We will present some of the leading ideas contained in it together with other information deserving attention.

In our variable climate, it is necessary for soldiers to have clothes that will afford judicious protection against excessive heats and sudden chills. The head and neck should always be covered when exposed to the burning sun, to prevent sun-stroke, and the body should be sufficiently covered during night, and in rainy weather, to prevent chills.

Cleanliness of the person and of the clothes are necessary to health. When in the field, on active duty, soldiers are in the habit of sleeping with their wearing apparel on, so as to be in readiness to repel an attack or to march at a moment's warning. In such cases it is very difficult to keep the clothes clean, but a very good plan to pursue, is to employ ten or fifteen minutes daily in taking off the entire clothing, hanging the different parts on tent poles or the posts of a fence, and switching them well with a ramrod or a switch cut from a neighboring tree. This will tend to prevent the increase and development of noxious vermin. Bathing daily, either in a stream or only with a sponge, is likewise essential to health.

After a march, or when marching, the face and particularly the eyes, should be wiped with a moist cloth or sponge to remove the dust. The face should never be washed with cold water when heated, either upon or after a march, as by suddenly checking perspiration inflammation of the eyes is very likely to result.

Soldiers are exhorted not to sit or recline upon the damp grass when tired. To enjoy a few minutes' rest on a severe march, it is better to lie down than to sit, but the blanket, or greatcoat should always be employed for reclining upon. When warm with rapid exercise, either in hot or cold weather, a thirsty soldier should drink very cautiously. A French officer once dropped down dead after taking a hurried drink of cold water, in weather when snow was upon the ground. He was perspiring freely, being on a rapid march.

When sleeping at night, no matter how warm the weather may be, the body should be protected with a blanket, or some equally efficient covering. Dysentery most frequently breaks out in camps during nights in which heavy dew falls after a very hot day.

When a camp is situated near a marsh or stagnant pool, the backs of the tents should be arranged towards them ; but if possible, when in a marshy country, the camping or bivouacking ground should be chosen in a strip of forest or brushwood interposed between it and the marsh. Small brushwood and leaves make an excellent bed with an india-rubber cloth blanket spread over it, a knapsack for a pillow and a greatcoat for a coverlet.

After an exhausting effort, a cup of tea or coffee is recommended. Eating heartily after a weary march or a fatiguing struggle, is forbidden ; also eating heartily before going into a battle, and also immediately preceding lying down to sleep. Supper should always be early, but when prevented from obtaining it until a late hour, the quantity partaken should be very moderate. Better go to bed supperless than gorged with food.

It is a common practice in the army for soldiers to to have their canteens filled with whisky or brandy, of which they usually partake rather too freely when on a march and on guard during night. Atkinson, the English traveler in Tartary and Siberia, states that cold tea is more exhilarating when traveling than ardent spirits, according to his experience. Weak wine is used by the French soldiers, and in situations where the water is bad, coffee or some other pleasant and palatable beverage is positively necessary.—Nothing tends to dispirit men more than water or food which they loathe. Before and after mounting guard, a cup of warm coffee would be a blessing by day and night, but such luxuries are not regularly provided in the common regulations of an army.

It is rather remarkable that with the improvements made in the implements of war, the provisioning of armies goes on in the old-fashioned manner. Milk and butter are unknown in army rations.

Fevers, diarrhea and dysentery are the most prevalent diseases in armies. The first is generally preceded by costiveness. To prevent this, the bowels should be kept in proper condition A very small piece of rhubarb chewed and swallowed daily, or every second day, is a good preventive of costiveness, and it is generally used in European armies for this purpose. When a soldier is attacked with diarrhea, he should bind a handkerchief or piece of flannel round his bowels, and, if possible, lie perfectly still. Dysentery is usually attended with severe pain ; the surgeon of the regiment should at once be informed of every case of sickness among the men over whom he is placed as the guardian of their health.

The Comet as it Appeared to the Eyes of a Common Man.

I first saw it on Sunday evening, 30th ult., 9 P. M. It was then about 40° above the north-west horizon. Both nucleus and tail presented a dull, hazy, whitish appearance.

Our next view of the heavenly visitor was on the evening of the 2d inst., at 9 P. M. It was then a a little past the zenith, moving in a north-west path. We kept company with the comet for an hour and a half, assisted by a good telescope, and had a fine time.

At intervals during this observation the comet presented a most brilliant and extraordinary appearance. The nucleus and tail would shine out with great distinctness and fervor for a brief period, and then the glow of light seemed to subside, and the whole body would assume a hazy, dull, diminished look. During some of the intervals of greatest brilliancy the nucleus had a bluish tinge, and appeared like a flaming ball of fire. The tail extended back in regular fan shape, and very bright, for a comparatively short distance, and from the center of this bright fan arose another tail, of less width, and less brilliancy, but of astonishing length, extending more than half across the heavens.

Sometimes the head of the comet would be buried in a cloud, from which arose a most glorious pillar of light, reminding us of the divine record of that miraculous signal by which the great God led onward the triumphant hosts of Israel.

Again, the nucleus would emerge from the cloud, leaving the brightest portion of the tail obscured. We then had the appearance of an independent patch or body of light, irregular in form, rather hazy, and nearly as large as a three-quarter moon.

Seen through the telescope, we observed at all times, near the head of the comet, a small but distinct ball of glowing fire. It was not so large as a star of the second magnitude, nor so clear, nor so steady. A halo or illuminated atmosphere of the same stuff as the tail, seemed to project in advance of the ball, to a distance, say fifteen times its diameter.

The tail, viewed through the glass, seemed to be composed of infinitesimal specks of fire, which had a contracting and expanding movement toward and from the center, and also a sidewise, swaying motion.

The comet stood at about 45° above the horizon at 10.30 P. M., when a deep curtain of clouds was drawn between us and the object of our wondering gaze. Your correspondent thereupon took the hint, and went to bed. NOT AN ASTRONOMER.

THE RIGHT OF SECESSION.—We learn from the *National Intelligencer* that in ratifying the Constitution of the Southern Confederacy, Virginia has reserved to herself the right to secede whenever she chooses so to do. Robert E. Scott, Esq., a leading politician opposed the reservation on the grouud that he "*had seen enough of secession*," and wanted a permanent thing this time. The general prevalence of the doctrine of State Rights at the South will not allow the existence of any government supreme to State authority, unless, indeed, the Federal government shall succeed in maintaining itself against usurpation—which it is very likely to do.

ALUMINUM IN GREENLAND.—The Edinburgh *Courant* states that two Danish vessels have sailed from Leith for Greenland, for procuring cargoes of cryolite—the mineral from which aluminum is obtained in largest quantities. Several very valuable minerals are obtained from Greenland. Plumbago is abundant in these regions ; but the cryolite is the most important of Greenland's products, because aluminum is daily increasing in favor, as a most beautiful metal, capable of superseding silver for many purposes.

Manufacturing News.

The Ames Company, at Chicopee, Mass., are running night and day, finishing off government work, and employ a force of 500 men—200 more than ever before employed in that establishment. Emerson Gaylord, of the same place, has also 150 men in his employ at work on military accouterments and mail bags.

The Arms Company, at Chicopee Falls, Mass., have nearly rebuilt their shops which were destroyed by fire last winter, and are now getting in their new machinery, preparatory to driving a more extensive business than ever before.

A company has been organized for the manufacture of type-setting machines, invented by Chas. W. Felt, of Salem, Mass.

The proprietors of the Fitchburg (Mass.) Woolen Mill are about to enlarge their building by putting on an addition of 42½ feet in length. They are forced to do this in order to meet the increasing demand for their goods. They are now making cadet grays and army blues, which are especially sought for at this time for military purposes.

Messrs. Elijah W. Upton and James M. Caller are about to rebuild the Southwick Tannery, in South Danvers, Mass., which was partially destroyed by fire in February, 1860. It is calculated that an outlay of $7,500 will put the tannery and outbuildings in complete order.

The removal of the duck looms from the mill at Duckville (Palmer), Mass., to make room for looms for weaving finer cloth has been stopped, and workmen are replacing those already removed. The war makes a large demand for sailcloth.

TARGET PRACTICE.—The curvature of the earth, or depression at any given point with reference to the horizon of another given place as a starting point, increases as the squares of the distances from the starting point. The curvature at the end of one mile is 8 inches *very nearly*. Then the depression at different distances will be as follows :—

	In.	*In.*	*Feet.*
At 1 miles it will be $1^2 \times 8 =$		8 =	$\frac{2}{3}$
At 2 miles it will be $2^2 \times 8 =$		32 =	$2\frac{2}{3}$
At 3 miles it will be $3^2 \times 8 =$		72 =	6
At 4 miles it will be $4^2 \times 8 =$		128 =	$10\frac{2}{3}$
At 5 miles it will be $5^2 \times 8 =$		200 =	$16\frac{2}{3}$
At 6 miles it will be $6\frac{2}{3} \times 8 =$		288 =	$16\frac{2}{3}$

And so on, increasing in proportion to the squares of the distances.

Giffard's Injector.

Some of our English cotemporaries say :—

The principle of Giffard's injecter appears to have been known upwards of a century ago. In 1753, Mr. Richard Savery, of Birmingham, published a book in which he gave a plan and description of an apparatus for raising water by steam. A conical nozzle, discharging a jet of steam, was shown within another similar nozzle, as in the injector, the water being thus drawn up through, and discharged through the annular passage. Among other copies of Savery's book, one is now preserved at Messrs. Elkinton & Mason's, Birmingham.

We have no idea that it ever entered Savery's noddle to feed a column of water into a boiler with a jet of steam from the same boiler. This thing is trumped up by those who would like to enjoy the benefits of Giffard's invention without paying for it. When an invention becomes valuable, it is astonishing to find how many are ready to testify that it is an old and well-known contrivance.

A Safe Man to Insure.

By a steamboat explosion on a Western river, a passenger was thrown unhurt into the water, and at once struck out for the shore, blowing like a porpoise. He reached the bank almost exhausted, and was caught by a bystander, and drawn out panting.

"Well, old fellow," said his friend, "had a pretty hard time, eh?"

"Ye-yes, pretty hard, considerin'. Wasn't doin' it for myself, though ; was a workin' for one o' them insurance companies in New York. Got a policy on my life, and I wanted to save 'em. I didn't care."

IN the war of 1812, every soldier was advised to carry a string, to be tied round a bleeding limb and be twisted tight by a stick or ramrod until a surgeon could be found.

Very little tea is imported into Germany.

© 1861 SCIENTIFIC AMERICAN, INC.

RECENT AMERICAN INVENTIONS.

Centrifugal Governor.—This invention, by C. T. Porter, of New York city, relates to the employment of the resistance of a spring as a counterpoise to the centrifugal force of the balls and arms of a centrifugal governor, by which means such a governor is made capable of working in a horizontal or other position, and hence suitable for marine engines. The improvement consists in so applying and combining the balls and arms, and the spring, that in all positions of the balls and arms, the distance through which the spring is deflected shall bear a nearly constant ratio to the radius of the circle described by the center of gyration of the balls and arms, thereby making the governor extremely sensitive to the slightest variation in the speed of the engine.

Distilling Oil.—This invention consists in the arrangement of a series of retorts, one above the other, in the same furnace, in combination with a suitable supply pipe, overflow pipes and a steam pipe, the steam passing through which is superheated by running it down through the interior of the furnace, and which communicates with each of the retorts in such a manner that the crude oil supplied to the uppermost retort, and running from the same by the overflow pipes to the lower retorts, is gradually heated, and the vapors of the oil, mixed with the superheated steam, is carried into one or more condensing chambers, where both the vapors of the oil and the steam are condensed by the action of one or more jets of water introduced through suitable noses, and thus mixing the vapors of the oil with steam ; and, condensing them simultaneously with the steam, the oil is refined and deodorized by one operation. It also consists in connecting the several retorts, by means of pipes, in such a manner that the vapors formed in all the retorts are returned to the highest retort, from which they pass off into the condensing chamber. The credit of this invention is due to E. G. Kelley, of New York city, and A. H. Tait, of Jersey City, N. J.

Slide Valves.—The object of this invention is to obviate the great objection to the use, in steam engines, of a slide valve with a long lap, viz.: the compression of the steam on the exhaust side of the piston by the closing of the port before the stroke of the piston is completed, and, by enabling the valve to be made with a larger lap than has been heretofore considered practicable, to provide for a greater degree of expansion of the steam in the cylinder ; and to this end, the invention consists in what may be denominated an "anti-compression valve," fitted to a chest provided for it on the main valve, and operating in combination with passages opening into the face of the main valve. A. J. Stevens, of Aurora, Ill., is the inventor.

Steamer Burned.

The steam propeler *Cataract* was burned on the 16th ult. on Lake Erie, near Erie, Pa. It is supposed the vessel took fire under the boiler deck. She was loaded with provisions, and was burned to the water's edge.

A quantity of alcohol had been stowed away not above 12 feet from the boilers ; it is supposed that this caught fire, as an apparent explosion took place at about the time the fire was first observed. The crew were saved by boats from Erie. Had the steamer been protected from fire by having the boiler room lined with iron plates, this accident would not have happened. The Inspectors of Steamboats should not grant a license to any boat running on our lakes, rivers or seas, the boiler room of which is not lined with iron plates.

Ages of the States.

The following chronological table may be interesting to our readers at the present crisis:—

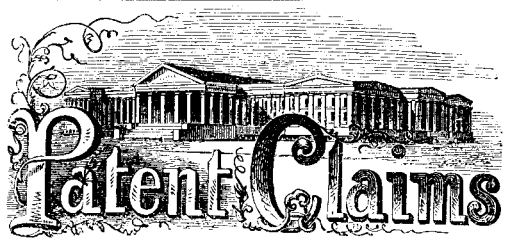
SETTLEMENTS.

1607. Virginia, by the English.	1635. Rhode Island, by Roger Williams.
1613. New York, by the Dutch.	1639. N. Carolina, by the English.
1620. Massachusetts, by Puritans.	1670. S. Carolina, by the English.
1624. New Jersey, by the Dutch.	1682. Pennsylvania, by Wm. Penn.
1628. Delaware, Swedes and Fins.	1732. Georgia, by Oglethorpe.
1635. Maryland, by Irish Catholics	

ADMITTED INTO THE UNION.

1792. Vermont.	1818. Illinois.	1845. Texas.
1792. Kentucky.	1819. Alabama.	1846. Iowa.
1796. Tennessee.	1820. Maine.	1848. Wisconsin.
1802. Ohio.	1822. Missouri.	1850. California.
1811. Louisiana.	1836. Michigan.	1858. Minnesota.
1816. Indiana.	1836. Arkansas.	1858. Oregon.
1816. Mississippi.	1845. Florida.	1861. Kansas.

Fifteen hundred acres have been planted with cotton this year, in Jamaica, as an experiment.



ISSUED FROM THE UNITED STATES PATENT OFFICE

FOR THE WEEK ENDING JUNE 18, 1861.

Reported Officially for the Scientific American.

*** Pamphlets giving full particulars of the mode of applying for patents, under the new law which went into force March 4, 1861, specifying size of model required, and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

1,548.—J. J. Adams, of New York City, for an Improved Flexible Back Brush :

I claim my improved mode of constructing a leather flexible brush, the same consisting in securing all the rows of bristles, except the outer one, in the body of the brush, as set forth, then cementing the cover or upper plate to the body and finally securing the outer row of bristles and the leather portion of the brush at the same time by a single line of wire, as specified.

1,549.—C. T. Anderson, of Hyattstown, Md., for an Improved Churn :

I claim, first, The combination with the bellows, A, and vertical nozzle, G, of the pivotted reciprocating dasher, M, constructed and operated substantially as and for the purposes set forth.

Second, The described combination of the nozzle, G, detachable dasher, M, and eccentrically pivotted disk, I, arranged and operating as explained.

[The object of this invention is to inject air beneath the cream by the action of the same lever which operates the reciprocating dasher, and the invention further provides means for readily detaching the parts for purposes of cleansing.]

1,550.—Edward Badlam, of Ogdensburgh, N. Y., for an Improvement in Seeding Harrows :

I claim the arrangement of the transverse harrow, M, seed sowers, U U, and roller, C, all receiving their motion from roller, C, and combined and arranged for the purposes set forth.

1,551.—A. D. Briggs, of Springfield, Mass., for an Improvement in the Mode of Connecting the Braces of Iron Bridges :

I claim my improved mode of constructing and arranging the clamp plates and braces, by which improvement each brace is made to lock into but one of the clamp plates, and simply lap over or across, the other brace, but not interlock therewith, the whole being substantially in manner and for the purpose set forth.

1,552.—Robert Brown, of Frederick, Md., for an Improvement in Harvesters :

I claim, first, Securing both the finger bar and the rake frame to a hollow shaft, L, the journals, l, of which run in bearings, M, in the main frame and themselves constitute bearings for the journals, h, of the crank shaft, all as shown and explained and for the purposes set forth.

Second, The reel attachments, n n1 n2 n3, constructed, combined and arranged in the manner specified, to enable the attachment of any desired number of arms.

[In this machine a combined reel and rake, revolving as a vertical shaft, are employed to hold the grain to the cutters and discharge it from the platform. The standards in which the rake revolves are rigid with the finger bar, and by mounting both on journals concentric with and surrounding those of the driving shaft. The rake is made to work equally well in any position of the finger bar. Great facility is afforded for changing the number of rake arms and for detaching the raking apparatus and platform so as to convert the machine into a grass harvester.]

1,553.—J. G. Collins, of Boston, Mass., for an Improvement in the Mode of Securing Bottoms to Stills :

I claim the ring or clamp, i, in combination with the bottom, a, and the flange, b, each formed and constructed substantially as above described.

1,454.—L. H. Gano, of Ripon, Wis., for an Improvement in Buggy Tops :

I claim, the employment of the lever, a, rod, d, disk, e, spring, D, and rods, B B, together with the wheel or its equivalent, upon the lower portions of the front rib or bow of the top, the several parts being arranged and used as and for the purpose specified.

1,555.—Charles Gregg, of New York City, for an Improved Automatic Regulator for Steam Heating apparatus :

I claim regulating or varying the supply of cold air to the steam heating surfaces automatically, to suit the condition of said heating surfaces, by means of a spring damper, in the supply pipe, connected to the piston, or diaphragm, the whole arranged to operate as and for the above described purpose.

1,556.—Joseph and St. Clair Gum, of Marseilles, Ill., for an Improvement in Cultivators :

We claim the combination of the lever, l, the levers, l' l', to control the lateral and vertical movements of the cultivators, while in use, with the upright hooked metallic rod, r, by use of which to adjust the cultivators from the ground, for removing the machine from place to place, when the machine is not used in cultivation, substantially as described.

1,557.—S. S. Hersey, of Farmington, Maine, for an Improved Apple Parer :

I claim, first, The arrangement of the spring, L, knife bar, M, sector, J, and wheel, I, substantially as shown, so that the spring, L, may perform the double function of keeping the knife, O, to its work, and throw back the knife to its original or starting point after the completion of its work, as set forth.

Second, The employment or use of the projection, h, on wheel, C, in combination with the lever, P, arranged in relation with sector J, to operate as and for the purpose set forth.

[This invention consists in a novel and improved arrangement of a spring, knife bar, and gearing, whereby a very simple and efficient apple-paring device is obtained. The invention also consists in the employment or use of a deflector attached to the cutter head, for the purpose of turning or casting off the parings from the machine. The invention further consists in the employment or use of a lever so applied and arranged as to serve as a stop or guard to insure the harmonious action of the working parts.]

1,558.—Ralph Hill, of New York City, for an Improvement in Daguerreotype Cases :

I claim providing daguerreotype cases with metallic rims, B, swaged or struck up with flanches, a a, and notches, as shown at b, to form miter joints at the corners of the case and connected by wires, c, to form hinges or joints for the cases, substantially as and for the purpose set forth.

[This invention consists in encompassing the case with a metal rim, whereby a strong and durable case is obtained and also a very ornamental and economical one.]

1,559.—J. J. Hirschbühl, of Louisville, Ky., for an Improved Padlock :

I claim, first, The employment or use of the dogs, D E F, and slide, G, when combined and arranged with the bow or shackle, B, substantially as shown, so as to secure both ends of the same.

Second, The employment or use of the pin, t, placed in the bit-plate of the key, J, and used in connection with the slotted plate, q, for the purpose of actuating the slide, G, as set forth.

Third, The arm, w, attached to the outer end of the slide, G, in combination with the slide, a', on the bow or shackle for the purpose of throwing the notch, n, of slide G, out of the reach of the pin, t, of the key, J, as set forth.

[The object of this invention is to obtain a padlock that will be unpickable and still comparatively simple in construction, and one that may be constructed at a moderate cost.]

1,560.—T. C. Hooker, of Kendall, N. Y., for an Improvement in Harrows :

I claim connecting the two parts, A A, of a harrow together by means of the links, b b, and the rod or hasp, D, when the latter is of a greater length than the former, and all arranged substantially as and for the purpose set forth.

[This invention relates to an improvement in that class of harrows which are formed of two or more parts connected by joints or hinges, and which are generally termed flexible harrows. The object of the invention is to give, by a very simple means, a harrow of the class described a greater degree of flexibility than usual, so that the parts may not only rise and fall to conform to the inequalities of the surface of the ground, but also leave a general or universal movement to a certain extent, and the parts of the harrow, at the same time, kept in a proper relative position with each other at all times.]

1,561.—S. S. Howard, of Milton, N. Y., for an Improvement in Grinding Mills :

I claim having the support or bracket, e, of the bearing, d, cast with a basin or bowl, F, substantially as shown, for the purpose of forming the lower part of the hopper, G, the upper part of which registers with the basin or bowl, F, when the two boxes, A C, are secured together, by which arrangement the bearing, d, is cast with the box, A, and a strong and durable connection obtained.

[This invention relates to an improvement in that class of grinding mills which are composed of a conical grinder fitted within a corresponding conical shell or bed enclosed within a suitable cast-metal box having a hopper at one end of it.]

1,562.—John P. Jamison, of New York City, for an Improved Drawing Instrument :

First, I claim the slide, I, pencil holder, J, and beam, A2, when the same shall be combined and operated in connection with the beam, A, as shown, for the purpose specified.

Second, In combination with the same, I claim the pointer, E, and circular plate, C, arranged and operated in the manner described for the purpose shown.

Third, I claim the pencil holder, M, operating as described, in combination with the pencil holder, J, slide, I, beam, A2, and tube, D, arranged and operated as shown for the purpose set forth.

Fourth, I claim the point, F, inserted in the tube, D, in combination with the slide, I, and pencil holder, J, arranged and operated as described for the purpose set forth.

1,563.—John Keezer, of Chillicothe, Ohio, for an Improvement in Cultivators :

First, I claim adjusting the distance between the teeth, f f, or those used in their stead, by means of the adjustable fastenings, h h, and g g, and stay rods, i i, when used in combination with the gallows frames, B and C, and stay rods, a a, constructed and arranged substantially as and for the purpose set forth.

Second, In combination with the foregoing I claim the stays, F and E, swivel, G, screw, b, and nut, c, when arranged in relation to each other and operated in the manner and for the purpose described.

1,564.—E. G. Kelley, of New York City, and A. H. Tait, of Jersey City, N. J., for an Improvement in Apparatus for Distilling Oils :

I claim, first, The arrangement of a vertical range of retorts, A, in an upright furnace, B, in combination with the supply pipe, d, connecting overflow pipes, e, steam pipe, D, and branch pipes, g, all constructed and operating in the manner and for the purpose shown and described.

Second, The combination of the vertical range of retorts, A, steam pipe, D, and one or more condensing chambers, E E', substantially as and for the purpose described.

Third, The arrangement of the pipes, e*, in combination with the vertical range of retorts, A, and connecting pipes, e, as and for the purpose set forth.

1,565.—M. J. Knox, of Knox Corners, N. Y., for an Improved Clothes Frame :

I claim the clothes frame described and represented, consisting of the bars, A A and B B, extension slotted bars, b b A' A' B' B', tightening screws and nuts, c d, and clothes line, D, all arranged, combined and operating substantially as set forth.

[The object of this invention is to construct a double quadrangular clothes rack or frame in such a manner that it can be extended or contracted at pleasure for adapting it to contain and support a large or small quantity of articles for drying.]

1,566.—F. W. Krause and G. W. Strong, of Chicago, Ill., for an Improvement in Grinding Mills :

We claim the arrangement on the same horizontal shaft, C, of a toothed cylinder, E, working in a jointed spring concave, G, in combination with the self-feeding, spirally-toothed cracking cylinder, J, self-adjusting runner, L, a cup-shaped toothed clutch, M, with a corresponding semi-spherical projection, m, on the back of the runner, L, constructed and operating as and for the purpose specified.

[This invention is particularly intended for grinding corn, and consists in arranging on the same horizontal shaft a toothed cylinder working in a longitudinally slotted jointed spring, concave, and a self-feeding corn cracecr, together with a grinding disk, or runner of peculiar construction, so that the same machines serves for shelling, cracking and grinding the corn in an easy and perfect manner. Second, in arranging the teeth of the corn cracker in a spiral line and with beveled cutting edges, in combination with a series of teeth of a similar form placed spirally in a corresponding concave or shell, so that the corn or other substance to be cracked is fed up to the grinding disk through the action of said teeth. Third, in the arrangement of a cup-shaped toothed clutch in combination with a corresponding semi-spherical projection on the back of the grinding disk or runner, and with a suitable spring, in such a manner that the runner is free to adjust itself to the stationary surface.]

1,567.—George Lane, of New York City, for an Improvement in Rulers :

I claim a ruler having a capiliary groove, e, formed in one or both of its straight edges, substantially as and for the purpose described.

[The object of this invention and improvement in rulers is to effectually prevent ink from the pen running over the edge of the ruler, and getting on the paper which is being ruled. The nature of this invention consists in forming in a suitable beveled straight edge of a wooden or metallic ruler, a deep groove of a suitable depth which will absorb any ink running over the edge of the ruler, and prevent it from getting on the paper which is being ruled.]

1,568.—Geo. Mann, Jr., of Ottawa, Ill., for an Improved Safety Guard for Steam Boilers :

I claim, first, The employment of one or more explosive disks or plates, D, constructed as described, with a concentric groove or grooves, f f, near the margin, and applied substantially as specified, in combination with the fusible plug, g, as set forth.

Second, The valve, E, applied below and in combination with the explosive disk, D, substantially as and for the purpose set forth.

Third, The alarm whistle, G, and pressure valve, I, employed in connection with the disk, D, substantially as and for the purpose herein described.

Fourth, The guard pin, L, applied in combination with the valve, E, and disk or plate, D, substantially as and for the purpose specified.

© 1861 SCIENTIFIC AMERICAN, INC.

This invention consists in a novel construction and arrangement for application to a steam boiler of a metallic disk or plate weaker than any part of the boiler, to be burst and blown away when the pressure in the boiler rises to near a dangerous point. It also consists in the arrangement of a fusible plug on said plate, and also in the employment below and in combination with such disk, disks, plate or plates of a valve so applied as to be capable of closing the boiler after the blowing away of such disk or plate, to permit the said disks or plates, to be replaced by a new one, without waiting for the steam to subside in the boiler. And it further consists in a certain arrangement of a steam whistle or other alarm, and a pressure valve, in combination with such disk or plate, whereby an alarm may be given before the pressure of the steam becomes so high as to cause the explosion of said disk or plate. This requires an invention to give a good explanation of it.]

1,569.—O. W. Marshall, of Windsor Locks, Conn., for an Improved Railroad Switch:

I claim the employment of the shaft, c, dogs, b, arranged in connection with the chairs or head blocks, A, and rails, a and a', substantially in the manner as and for the purpose described.

1,570.—F. B. McGregor, of Commerce, Mich., for an Improvement in Water Elevators:

I claim the arrangement of the receiving trough with the windlass, B, hooks, G, buckets, E, and short bars, F, in the manner and for the purpose shown and described; and in combination therewith I claim the arrangement of the bail, K, with the pawls, J J, and double ratchet wheel, L, in the manner and for the purpose shown and described.

1,571.—Christopher Meyer, of New Brunswick, N. J., for an Improvement in Boots and Shoes:

I claim a shoe of which the upper is made of cloth or or other fabric permeable to moisture, coated with rubber in the manner described, in such parts as may be desirable, and having its sole made of sole leather or some substance other than india rubber or gutta percha.

I also claim an upper, prepared as above described, to be used for the purpose above set forth.

1,572.—Nathan Miller, of Finley, Ohio, for an Improvement in Water Elevators for Cattle:

I claim the combination of the tilting platform, H, with the platform, F, when the latter is connected to the plunger, C, which is fitted within the cylinder, B, and provided with the eduction or water discharge tube, I, all arranged to operate as and for the purpose set forth.

[The object of this invention is to obtain a pump of simple construction that will admit of water being readily elevated by stock.]

1,573.—Nathan Miller, of Finley, Ohio, for an Improvement in Pumps:

I claim the combination of the platform, I, box, A, and plunger, B, provided with the tube, C, when the platform and plunger are connected by the levers, E, and uprights, G H, arranged substantially as and for the purpose set forth.

[This invention relates to an improvement in that class of pumps in which the water is elevated by a direct pressure of the piston, instead of the pressure of the atmosphere. The object is to obtain a pump of the class specified which may be operated with facility, be simple in construction and capable, by manual operation, of elevating water to any desired hight in dwelling houses for domestic use, or capable of elevating it in out-buildings or other localities, by means of the cattle or stock, the latter raising their own water.]

1,574.—S. G. Morrison, of Williamsport, Pa., for an Improved mode of Cleaning and Feeding Grain to Buhr Mill Stones:

I claim the hopper, T T, constructed and used as described, the cylinder, H H, with its rubber, and the cylinder, K, in combination with the horizontal exhaust fan, and the feed regulating device.

1,575.—S. G. Morrison, of Williamsport, Pa., for an Improvement in Ventilating Mill Stones:

I claim the pipe, c, surrounding the curb and having openings, as shown and described, in connection with the fan blower, the parts being arranged and operated as set forth.

1,576.—Eli Mosher, of Flint, Mich., for an Improvement in Water Elevators:

I claim, first, The adjusting shaft, y, in combination with the hoisting apparatus described, all being arranged and operated in the manner set forth.

Second, I claim brake x, serrated plate, v, adjusting shaft, y, ears, a a, stops, c c, and hoisting apparatus, when all shall be arranged and operated in the manner and for the purpose specified.

1,577.—Mortimer Nelson, of New York City, for an Improvement in the Mode of Selecting Balls for Games of Chance:

I claim the tally board, g, arranged in the manner substantially as shown, in combination with the selecting wheel, a, and sets of numbered balls, as specified.

1,578.—W. P. Penn, of Belleville, Ill., for an Improvement in Thrashing Machines:

I claim, first, The arrangement of the concave, b, over the cylinder, a, in combination with two close separator belts and two beaters, as and for the purpose described.

Second, The two metallic deflectors, in combination with the two separate belts, the riddle shoe and the tailings thrasher, arranged in the manner described, for the purpose of depositing the grain upon the riddle in the shoe, so that the unthrashed heads will chiefly fall in the rear of the thrashed grain upon the apron on the back part of the riddle.

Third, The combination of transverse crank shaft and blower, with the riddle shoe constructed as described, by which the heads may be transmitted from the upper sieve to the tailings thrasher.

Fourth, The construction of the riddle shoe, as described, with an apron on the rear end in combination with the spout of the tailings thrasher, occasioning the delivery of the unthrashed heads to the tailings thrasher.

Fifth, The small cylinder, u, and concave, v, constituting a tailings thrasher, arranged as shown, with a spout, w, passing under the apron of the riddle shoe, and delivering the thrashed grain upon the lower sieve.

Sixth, The arrangement of the fan and the nozzle of the fan chest, the riddle shoe and tailings thrasher, in the manner described and for the purpose specified.

Seventh, The combination of the two thrashers and two separator belts and beaters, arranged as described, with the concave b, and springs, c, in the manner and for the purpose specified.

1,579.—C. T. Porter, of New York City, for an Improvement in Centrifugal Governors for Steam Engines:

I claim giving to the spring of a centrifugal governor an initial deflection of such amount that in every position of the balls, the radius of the circle described by them, and the distance through which the spring is deflected, shall bear a nearly constant ratio with each other when constructed and operating substantially in the manner and for the purposes shown and described.

1,580.—Abel Post, of Henrietta, N. Y., for an Improved Mode of Ventilating Hay, Grain, &c.:

I claim the method of forming ventilating shafts in mows and stacks of hay or grain, by the employment of movable tubes or boxes, G G, which are gradually raised through and retained in the same during the act of building up, substantially as set forth.

1,581.—R. B. Pullan, of Cincinnati, Ohio, for an Improved Bedstead Drapery Fastener or Suspender:

I claim the uniting of three or more arms radiating from a common center by means of hinges, B B B B, substantially as and for the purposes described.

1,582.—John Robinson, of Andover, Mass., for an Improvement in Picker Motion for Looms:

I claim the above specified arrangement and application of the picker carrier, C, and the spring, b, with the pickerstaff and the shuttle box.

I also claim the combination and arrangement of the tailpiece, c, and the shoulder or stop, e, with the carrier, C, the shuttle box and the pickerstaff, as described.

I also claim the combination and arrangement of the supporting rod, h, the adjustable fulcrum supporter, g, the adjustable spring case, k, and the arm, m, the whole being applied to the pickerstaff and its spring as specified.

1,583.—Augustus Sanborn, of Glover, Vt., for an Improvement in Hillside Plows:

I claim the combination and arrangement of the auxiliary moldboard or wing, B, with the hillside plow, or its reversible moldboard, A, and to operate therewith substantially as specified.

I also claim the combination and arrangement of the bent arm, d, with the wing, B, and the reversible moldboard, the said arm being to enable a person to move the wing under circumstances and by means as described.

1,584.—J. S. Smith, of New York City, for an Improvement in Officers' Shoulder Straps:

I claim an officers' shoulder strap having its border and bars, or other devices, composed of plates of metal stamped or otherwise wrought to give their surfaces the form, and gilt or silvered and burnished, to give them the appearance of bullion embroidery.

[The shoulder straps worn by commissioned military and naval officers have heretofore always had the border and bars, or other devices denoting the officers' rank, embroidered upon them with bullion, which is very expensive, and soon becomes disfigured by constant wear; and owing to the little demand for this kind of work in ordinary times, and the consequently small number of persons capable of performing it, very much difficulty is found in meeting the demand at a time when, like the present, a large military force has to be clothed and equipped with the utmost expedition. This invention relates to a new article of manufacture to constitute a substitute for the embroidered bullion shoulder strap, which will be cheaper, more durable, capable of being renovated when tarnished or otherwise disfigured by wear, and which can be quickly made in large numbers whenever required, such new article of manufacture consisting in a shoulder strap having its border and bars or other devices composed of plates of metal stamped or otherwise wrought to give their surfaces the form of bullion embroidery, and gilt or plated and burnished to give them the desired appearance.]

1,585.—A. J. Stevens, of Aurora, Ill., for an Improved Slide Valve for Steam Engines:

I claim, first, The anti-compression valve, C, inclosed in a chest, D, secured to or formed upon the back of the main slide valve, and operating in combination with passages, C C', in the latter valve, substantially as and for the purpose specified.

Second, The tube, I, serving at the same time as a means of connecting the counter-pressure plate, H, with the main valve, and as a means of communication between the anti-compression valve chest, D, and the atmosphere or exhaust pipe.

Third, Combining the anti-compression valve, C, with the main valve by means of a bell crank or elbow lever, E, connecting their stems as described, and having one of its arms furnished with a friction roller, k, or its equivalent, working between stationary curved guides, m m, substantially as and for the purpose specified.

1,586.—Amasa Stone, of Philadelphia, Pa., for an Improved Apparatus for Inserting Stoppers in Bottles:

I claim making the piston or traverse rod which inserts the stopple in the bottle to revolve, and providing it with a crank and a device to couple it to the stopple to turn it, when it is inserted in the manner and for the purpose set forth.

1,587.—G. L. Turner, of New York City, for an Improved Car Spring:

I claim having the surface of the plate on which the rubber rests made inwardly descending from periphery to hub, as and for the purpose shown and described.

The arrangement of the guiding stop bars, b b', and pins, e f, with each other and with the guides, c c', springs, C, beams, A, and draw bar, B, all as shown and described.

I also claim having the guiding stop bar, b', arranged to swing upon a central axis upon the draw bar, B, as shown and described.

[This invention relates to an improvement in that class of springs which are composed of india-rubber and metallic plates, and has for its object, first, the preventing of the rupturing of the rubber under compression, a contingency of frequent occurrence in this class of springs; and, second, the preventing of an undue compression of the rubber.]

1,588.—V. Weitz, of Cleveland, Ohio, for an Improvement in Pumps:

I claim the arrangement of one piston rod within and concentric with another hollow piston rod, when used in combination with a pump cylinder containing two pistons working opposite to each other, in the manner and for the purpose described.

Also, the relative arrangement of one piston rod working through and concentric with another hollow piston rod, and of a vibrating arc, chains and guide rollers, in the manner and for the purpose described.

Also, in combination with the preceding, the relative arrangement of a discharge tube perforated at the bottom end, an elastic reservoir and hose, as described.

1,589.—Jerome Wheelock, of Worcester, Mass., for an Improved Rotary Valve for Steam Engines:

I claim, first, The packing rings, M, when used in connection with the end chambers, C1 C2, and apertures, f f', in the manner and for the purposes explained.

Second, The combination of the centering screw, J, and steel bushings, d e j, with the conical plug valve, F, substantially as and for the purposes set forth.

1,590.—J. M. Whitall, of Philadelphia, Pa., for an Improvement in Preserve Jars:

I claim, as a new and improved article of manufacture, a jar with a groove around its mouth, provided with an india-rubber ring and provided with a top beveled on the underside, as described, for the purposes set forth.

1,591.—Robert Creuzbaur, of Travis county, Texas, for an Improvement in Air Chambers:

I claim, first, The combination and arrangement of the diaphragmed air chamber, a b r, replenishing pump, P, jointed piston rod, s t, and detached cap, d, substantially in the manner and for the purpose described.

Second, The manner, substantially as described, of constructing a condensing or repienishing pump of an air chamber, so that the pump cylinder, while the piston is within it, can be closed airtight by a lid or cover, d, for the purpose set forth.

1,592.—Andrew Dray, of Portland, Oregon, for an Improvement in Devices for Leveling Millstones:

I claim the band or hoop, A, in connection with the clamp formed of the plates, C C', the latter being applied to the former, and provided with the cloth or other color-absorber or retainer, E, as and for the purpose set forth.

I further claim, in combination with the band or hoop, A, and plates, C C', the spirit levels, B, applied to the band or hoop, as and for the purpose set forth.

[The object of this invention is to obtain a superior and efficient device that will supersede the ordinary workingstaff, proofstaff and spirit level, tools hitherto used for facing and leveling millstones.]

1,593.—Eli Duncan, of West Hilton, Ohio, for an Improved Fruit-drying Apparatus:

I claim the flues, d d, the apertures, g g, and valves, h h, when used in connection with the fruit trays, G G, all substantially arranged as and for the purpose set forth.

1,594.—John and Samuel Fahrney, of Washington county, Md., for an Improvement in Seed Drills:

We claim the set of levers, D E and G, forming a flexible lever or system of levers, for the purpose of regulating the pressure upon the drill tubes or openers, substantially as set forth.

We also claim the arrangement of the weighted lever, I, and the lever, S, substantially in the manner and for the purposes specified.

1,595.—J. T. Foster, of Jersey City, N. J., for an Improvement in Harrows:

I claim suspending separately and loosely each one of the oscillating bars, E, so that it will adapt itself to the inequalities of face, constructed and arranged substantially as described.

1,596.—R. J. Gatling, of Indianapolis, Ind., for an Improvement in Machines for Paving and Pulverizing the Soil:

I claim the shares or cutters lettered K, when made, constructed, arranged and operated substantially as shown and specified, for the purpose set forth.

1,597.—Charles Bush (assignor to himself and James Wygant), of Newburgh, N. Y., for an Improvement in Horse-hitching Posts:

I claim combining with a hitching post a casing, A, substantially as and for the purposes described.

[The object of this invention and improvement in horse-hitching posts is to combine with the post a barrel or casing, which, being sunk below the surface of the pavement, will form a guide for receiving the post, and keep it in a firm, steady position, and, at the same time, allow the entire post to be dropped down into it so that the top of the post will be level with the surface of the pavement; and when the post is not in immediate use, it can thus be put out of sight and out of the way.]

1,598.—Franklin Clark, of Charlotte, N. Y., assignor to himself and N. Coones, of London, C. W., for an Improvement in Harvesting Machines:

I claim the combination of the internal serpentine groove, a*, swinging arm, B, shaft, H, slotted bracket, G, and lever, E, operating in connection with the driving wheel, A, and the connecting rod, I, of the cutter, J, in the manner and for the purposes set forth.

[This invention consists in an improved mode of transmitting motion from the driving wheel to a reciprocating cutter in grain or grass harvesters. Its leading advantages are the avoidance of unnecessary friction, tremor and elasticity in the parts, and preventing liability to choke or clog.]

1,599.—Samuel Nowlan (assignor to Charles Mettam & Co.), of New York City, for an Improvement in Galvanic Soles:

I claim, as a new article of manufacture, the described galvanic boot or shoe sole, the same consisting of copper and zinc plates, united in separate relations to their contiguous sections by means of a flexible insulating strip or strips and eyelet fastening, substantially as described and for the purpose set forth.

1,600.—Joel Webster (assignor to himself and G. C. & T. H. Hotchkiss), of Brooklyn, N. Y., for an Improved Journal Box:

I claim the employment of the sleeve, C, with one-half circular groove, a, in combination with the shafts, A, balls, D, and box, B, the latter being provided with one-half circular groove, b, and the whole being arranged, constructed and operating substantially as and for the purpose set forth.

[The object of this invention is to reduce the friction of a journal in its box, by making said journal run wholly and entirely on balls interposed between it and the box.]

RE-ISSUES.

93.—Lewis Moore, of Ypsilante, Mich., for an Improvement in Seeding Machines. Patented August 31, 1858:

I claim, first, The zigzag-shaped strip, D, in combination with a seed hopper, substantially as and for the purpose set forth.

Second, The combination of the thin zigzag-shaped strip, D, reciprocating bar, C, and adjustable perforated gage plate, B b b' c c, and hopper, A a, substantially as and for the purposes described.

Third, The combination of the gage plate, B, which has its ends, s, extending beyond the ends of the hopper, and has two different-sized sets of seed cells, b c, with the stationary perforated bottom, A a, and a vibrating seed-agitating bar, substantially as and for the purposes set forth.

94.—Christian Sharps, of Philadelphia, Pa., for an Improvement in Breech-loading Repeating Firearms. Patented Jan. 25, 1859:

I claim, first, Exploding in succession a number of cartridges of the class described, by means of a projection caused to revolve by the movement of the hammer, when the said cartridges are so arranged, in respect to the projection, that the latter shall strike the edge only of each cartridge in succession, as set forth.

Second, The lever, M, with its projection, V, and the rod, N, in combination with the barrel block and its stock, when the whole is arranged as set forth, and when the lever, M, is so formed as to serve the purpose of a trigger guard.

Third, Causing the spent cartridges to be withdrawn from the barrel during the moving out of the latter, by means of a clip or clips, t, applied and operating substantially as set forth.

95.—Wm. N. Whiteley, of Springfield, Ohio, assignee of J. L. Hardeman, deceased, late of Arrow Rock, Ill., for an Improvement in Machines for Cutting Hemp. Patented August 20, 1850:

I claim, first, In combination with the arm or finger bar, d, and main frame, o, when constructed substantially as described, the projecting point, f, constructed and connected as shown, for the purposes specified.

Second, In combination with the shafts, or their equivalents, and a cutting apparatus projecting out from one side of the main frame, the adjustable clevis, or its equivalent, arranged for shifting the point of draught, for the purpose specified, substantially as described.

96.—Wm. N. Whiteley, Jr., of Springfield, Ohio, assignee of J. L. Hardeman, deceased, late of Arrow Rock, Ill., for an Improvement in Machines for Cutting Hemp. Patented August 20, 1850:

I claim, first, In combination with a cutting apparatus which projects out from one side of the main driving wheel frame, the sustaining rod, h, or its equivalent, arranged and operating substantially as described, for the purpose set forth.

Second, In combination with a cutting apparatus which projects out from one side of the main driving wheel frame, the sustaining rod, h, wedge, a a a, Fig. 4, and revolving cone, substantially as described, for discharging the cut grain in the manner specified.

97.—Wm. N. Whiteley, Jr., of Springfield, Ohio, assignee of J. L. Hardeman, deceased, late of Arrow Rock, Ill., for an Improvement in Machines for Cutting Hemp. Patented August 20, 1850:

I claim, first, In combination with the main ground wheel frame and cutting apparatus of harvesting machines, the rack or comb which has no shaft passing through its center, and the ribs or fans of which have no connection with each other at their ends projecting over the cutting apparatus, substantially as described.

And, second, The use of the rack or comb as a substitute for the reel of the harvesting machine, the ends of the ribs of said rack which are projected out over the cutting apparatus having no connection with each other or with said apparatus, substantially as described.

And, third, In combination with the main ground wheel frame and cutting apparatus of harvesting machines, the latter of which projects out from one side of the former, the rack or comb, the ribs or fans of which move backward in, or nearly in, a horizontal plane, instead of in the arc of a circle, substantially as described.

NOTE.—The above list of patents, issued on the 18th of June, numbers fifty-two. Out of these, twenty-four patents—almost ONE-HALF—were solicited through the Scientific American Patent Agency.

Since our national troubles have culminated in war, a large proportion of the inventors of the loyal States have had their patent business transacted through this office.

We have a corps of draughtsmen and specification writers, competent, and ample in numbers, to do the entire patent business of the country.

See advertisement of the Scientific American Patent Agency, on another page.

PHOTOGRAPHS on glass or china are now enameled by an easy process.

© 1861 SCIENTIFIC AMERICAN, INC.

Notes and Queries

C. C. R., of N. H.—Both of your inventions were new to us until a few weeks ago. A patent has been officially ordered to issue and will be out in a few days, for a shell made in sections as you propose, and we consider it a new thing. A brass gun was fitted with steel ridges at a factory in Brooklyn, two or three weeks ago, but no patent has, to our knowledge, been applied for on such a gun.

A. J. D., of Md.—We can tolerate an honest difference of opinion upon all subjects—scientific, religious and political. It becomes a very different thing, however, when *opinions* assume the character of armed opposition to a government; it then becomes treason, which we regard as a crime of the deepest dye. The ancients visited this crime with far greater severity than we do, by making its consequences attach to the children of the traitor. Of course we do not approve of such severity, but we nevertheless think all traitors should be severely dealt with, otherwise society would have no security.

M. J. K., of N. Y.—There is nothing patentable in your shields. Single shields were used by soldiers before the invention of gunpowder, and it has been proposed to attach them to field pieces to shield the gunners. Soldiers generally have too much weight to carry without such contrivances.

T. M., of Pa.—To obtain indigo from the plant, it is steeped in a tank until fermentation takes place, when the indigo is dissolved from the plant and taken up by the water. It is then precipitated from the water by adding a little lime and beating the water as you would beat eggs. No lime is added to the best Bengal indigo; the coloring matter is precipitated entirely by the beating process.

J. H., of Ind.—The best varnish for iron chains is made of pure linseed oil well boiled and rendered quick drying by adding some litharge—about four ounces to the gallon. Color it black by adding some lampblack and a little asphalt. When resin is added to oil it renders it more liable to scale off. The chains should be thoroughly dried in a hot room before they are used.

J. H. T., of Pa.—The quantity of the tin produced from the mines of Cornwall and Devonshire, in England, amounts to about 7,000 tuns per annum. As we have to import all the tin which we use, the discovery of a rich mine of this metal would be one of the most valuable acquisitions to our commerce and manufactures. We hope you will follow up your researches.

W. H., of Pa.—We have never seen any other metal than steel employed for making dies to stamp metallic plates. No metal but steel will withstand the pressure to which dies are subjected.

P. McC, of Phila.—We never heard of experiments having been conducted under the patronage of the government with combined steam and air under water, for the purpose of propelling vessels. Your informant, we think, must be mistaken. Your former letter was not received.

H. C., of N. Y.—In order to color brass blue, mix some ultra marine with copal or other resin varnish, dip the brass into it, then dry in a warm room or oven. To bronze brass, mix some common bronze powder with lac varnish and dip the brass into it, and dry as before directed. All colors are put on brass with varnishes colored with appropriate pigments.

T. F. L., of R. I.—Gun cotton has been used for shells and for blasting rocks under water, for which purposes, we believe, it is better than powder, but for artillery and small arms it ignites too rapidly, so that it expends most of its force in a manner tending to burst the guns.

J. E. C., of Vt.—*Silliman's Journal* is a bi-monthly, 8vo., and the price is $5 a year. The boomerang is made of hard wood; it is about thirty inches long, three inches wide, and one in thickness. It is convex on one side and flat on the other, and is slightly curved. It is thrown by the natives of Australia with the flat side downwards.

S. G. H., of Mass.—The public opening of the Liverpool and Manchester Railway took place September 15, 1830, but engines had been running upon it for several months previously. The British Reform Bill passed March 1st, 1831.

J. L. M., of Pa.—Your "unpickable" pocket made of wire links is quite an old thing. A patent was refused for it several years ago.

Wm. J. S., of N. Y.—Our machine shops are fully able to produce all the cannon wanted and of the most perfect quality if the government will only give them the orders.

R. E., of N. Y.—A straight piece of iron wire connected with a galvanic battery introduced between the poles of a horse-shoe magnet and its armature, would have no effect on the attractive power.

S. F. D., of Me.—You will find the requirements of conditions for admission into the engineer department of the navy fully given on page 198 of the last volume of the Scientific American. It is No. 13, Vol. IV., New Series, of the date March 20, 1861.

J. H., of N. Y.—If you should double the size of both the water and steam cylinders of your steam pump, and reduce the pressure of the steam 50 per cent., it would not make the same number of strokes per minute.

O. B. V., of Ohio.—The telescopic sights to which you refer, illustrated on page 403 of our last valume, was credited to the London *Mechanics' Magazine*. Any maker of optical instruments could apply one to your rifle. The camphor-fluid barometer is to be found in almost every store where mathematical instruments are sold. The price of them varies from $2 to $3. It is formed of a glass tube containing camphorated spirits. Its mouth is closed with a piece of bladder usually surmounted with a small brass cap.

W. C., of Ind.—Common vulcanized india rubber can withstand a pretty high degree of heat and still retain its elasticity. It hes been used for the cartridges of rifles. The steel cannon, illustroted on page 48 of our last volume, has not been patented here we think.

T. S., of K. T.—There is nothing that will restore the natural color of gray hair, except by dyeing it. What do you want to restore it for? Gray hair is becoming. Waste is made in woolen manufactures. We presume machine card clothing is not imported, as the machine was invented and the manufacture originated in this country. We sympathise in your patriotic feelings. It does us good to see old Kentucky come out so square for the Union.

R. J. W., of Pa.—Photographic pictures have been frequently taken by artificial light.

H. J., of Ohio.—The path described by a ball in the atmosphere when projected from a gun, is a parabola.

Money Received

At the Scientific American Office on account of Patent

Office business, during one week preceding Wednesday, July 3, 1861:—

H. F., of Ohio, $25; A. R. D., of N. Y., $25; S. S. W., of N. Y., $25; D. R., of N. Y., $12; H. V. D., of N. Y., $30; C. A. W., of Mass., $5; J. H. V., of N. Y., $15; I. F., of Ky., $25; W. E., of N. Y., $15; M. & E., of Ill., $25; F. & C., of Conn., $15; A. R., of N. J., $25; J. H., of Pa., $25; A. A. L., of Iowa, $25; M. D. B., of Ill., $15; P. S., of Pa., $30; J. H. L., of N. Y., $15; M. C. W., of Ill., $10; J. T. S., of Wis., $250; W. F., of Iowa, $15; H. & M., of Ill.. $15; I. J. C., of N. Y., $15; J. C. G., of Mass., $45; S. I., of Pa., $10; O'B. & K., of Ohio, $25; J. B., of Mass., $25; E. H. L., of N. Y., $25; F. & H., of N. Y., $12; O. R. B., of N. Y., $15; C. T., of N. Y., $15; W. R., of N. Y., $15; G. I. W., of Mass., $22; C. N., of N. H., $22; K. H. C. P., of N. Y., $15; F. & W., of Iowa, $25; R. L., of R. I., $25; S. & A., of N. Y., $10; D. S., of Cal., $15; S. M., of N. Y., $15; C. A., of N. Y., $10; J. H. S., of N Y., $25; C. F., of Wis., $25; R. W., of Iowa, $15; P. F., of ——, $15; W. A. D., of Ill., $15; H. C., of Maine, $15; J. M. A. G., of Mass., $15; R. P. P., of N. Y., $80; G. L. K., of Pa., $20; E. A. K., of Conn., $20; W. J. S., of N. Y., $20; B. H., of Ill., $20; G. S., of N. Y., $20; S. M. R., of Mass., $20; M. L. P., of Ind., $20; G. S., of Iowa, $20; A. H. F., of Ill., $20; W. H. P., of N. Y., $10; D. R. P., of Mass., $25; J. P., of N. Y., $50; C. N. B., of Pa., $25; W. M., of Mass., $25; C. & B., of Mass., $25; S. & E., of N. J., $25.

Specifications and drawings and models belonging to

parties with the following initials have been forwarded to the Patent Office from June 26 to Wednesday, July 3, 1861:—

C. A. W., of Mass.; I. F., of Ky.; D. R., of N. Y.; E. H. E., of Mass.; J. H., of Pa.; H. F., of Ohio; M. C., of France; A. A. L., of Iowa; J. B. B., of Cal.; M. & O., of Ill.; J. J. S., of N. Y.; A. R., of N. J.; W. H., of Conn.; C. F., of Wis.; E. H. L., of N. Y.; O'B. & K., of Ohio; J. B., of Vt.; F. & W., of Iowa; R. L., of Mass.; J. H., of N. Y.; A. S. W., of N. Y.; S. I., of Pa.; F. & H., of N. Y.; G. J. W., of Mass.

New Books and Periodicals Received.

The New York Directory for 1862. Published by John F. Trow, 160 Greene street, this city.

Mr. Trow has issued his annual alphabetical list of the heads of families of this city, which was compiled and published immediately after the great moving on the first of May. In his preface, the compiler says:—"The Directory for the present year contains 152,825 names; last year it contained 150,303. Owing to the secession movement of the Cotton States, a diminution of this number might have been expected, but the present year shows an increase of 2,522 names. The grass which was to grow in Broadway when South Carolina seceded, has not yet begun to sprout, and the great artery of the city is as full of life and as plethoric as it has ever been."

We copy this paragraph to show the all-pervading presence of the thoughts of war. They enter even into the compilation of city directories! All residents of a city know the importance of a Directory, and it is convenient to have in the dwelling, as well as in store or shop for reference.

INSTRUCTIONS ABOUT EUROPEAN PATENTS, With a Synopsis of the Patent Laws of the Various Countries.

AMERICAN INVENTORS SHOULD BEAR IN MIND that, as a general rule, any invention which is valuable to the patentee in this country is worth equally as much in England and some other foreign countries. Four patents—American, English, French and Belgian—will secure an inventor exclusive monopoly to his discovery among 100,000,000 of the most intelligent people in the world. The facilities of business and steam communication are such that patents can be obtained abroad by our citizens almost as easily as at home. The majority of all patents taken out by Americans in foreign countries are obtained through the Scientific American Patent Agency. We have established agencies at all the principal European seats of government, and obtain patents in Great Britain, France, Belgium, Prussia, Austria, Spain, &c., with promptness and dispatch.

It is generally much better to apply for foreign patents simultaneously with the application here; or, if this cannot be conveniently done, as little time as possible should be lost after the patent is issued, as the laws in some foreign countries allow patents to any one who first makes the application, and in this way many inventors are deprived of valid patents for their own inventions.

Many valuable inventions are yearly introduced into Europe from the United State, by parties ever on the alert to pick up whatever they can lay their hands upon which may seem useful.

Models are not required in any European country, but the utmost care and experience is necessary in the preparation of each case.

GREAT BRITAIN.

Patents for inventions under the new law, as amended by the act of Oct. 1, 1852, and now in operation, include the United Kingdom of Great Britain and Ireland in one grant, which confers the exclusive right to make, use, exercise or vend. This is conceded to the inventor, or the introducer, for a period of fourteen years, subject, after the patent is granted, and the first expenses paid, to a government tax twice during its existence—once within three years, and once again within seven. The purchaser of a patent would assume the payment of these taxes.

There is no provision in the English law requiring that a patented invention shall be introduced into public use within any specified limit. Under the Patent Act of October, 1852, the British government relinquished its right to grant patents for any of its colonies, each colony being permitted to regulate its own patent system. If a patent has been previously taken out in a foreign country, the British patent will expire with it.

FRANCE.

Patents in France are granted for a term of fifteen years, unless the invention has been previously secured by patent in some other country; in such case, it must take date with and expire with the previous patent. After the patent is issued, the French government requires the payment of a small tax each year so long as the patent is kept alive, and two years' time is given to put the invention patented into practice.

It should be borne in mind that, although the French law does not require that the applicant should make oath to his papers, yet if a patent should be obtained by any other person than the inventor, upon proof being adduced to this effect before the proper tribunal, the patent would be declared illegal.

BELGIUM.

Patents in Belgium are granted for twenty years, or if previously patented in another country, they expire with the date thereof. The working of the invention must take place within one year from date of patent; but an extension for an additional year may be obtained on application to the proper authorities. Inventors are only legally entitled to take out patents.

THE NETHERLANDS.

Patents are granted by the Royal Institute of the Netherlands to natives or foreigners represented by a resident subject, which extend to a period of about two years, within which time the invention must be brought into use, and upon payment of an additional tax, a patent will be granted to complete its whole term of fifteen years. Unless these conditions are complied with, the patent ceases.

PRUSSIA.

Applications for patents in Prussia are examined by the Royal Polytechnic Commission, and unless there is novelty in the invention, the applicant's petition will be denied; and if it is granted, the invention must be worked within six months afterward. A respite, however, of six additional months may be obtained, if good and sufficient reasons for it can be shown.

AUSTRIA.

Austrian patents are granted for a term of fifteen years, upon the payment of 1,000 florins, or about $500 in American currency. This sum, however, is not all required to be paid in advance. It is usual to pay the tax for the first five years upon the deposit of the papers, and the patent must be worked within its first year. The Emperor can extend the patent and privilege of working by special grant. In order to obtain a patent in Austria, an authenticated copy of the original Letters Patent must be produced.

SPAIN.

The duration of a Spanish patent of importation is five years, and can be prolonged to ten years; and the invention is to be worked within one year and one day.

To obtain a Cuban patent requires a special application and an extra charge.

RUSSIA.

Since the close of the Crimean war, considerable attention has been given to Russian patents by Americans. Russia is a country rich in mineral and agricultural products, and there seems to be a field open for certain kinds of improvements. The present Emperor is very liberally disposed toward inventors, and as an evidence of the interest which he takes in the progress of mechanic arts, we may state that we have had visits from two distinguished Russian *sacans*, specially sent out by the Emperor to examine Amdrican inventions. As Russian patents are expensive, and somewhat difficult to obtain, we do not take it upon ourselves to advise applications; inventors must judge for themselves; and this remark applies not only to Russia, but also to all other foreign countries.

CANADA.

Patents of invention are granted only to actual residents of Canada and British subjects. Under the general Patent Law of Canada, an American cannot procure a patent for his invention there. The only way in which he can do so is by virtue of a special act of Parliament, which is very difficult, uncertain, and expensive to obtain. Several zealous friends of reform in Canada are working earnestly to bring about a reciprocal law, but their efforts have thus far proved fruitless.

BRITISH INDIA.

The date of the law, Feb. 28, 1856; duration of a patent, fourteen years. Invention must be worked within two years from date of petition. Privilege granted only to the original inventor or his authorized agent in India.

SAXONY.

Duration of patent, from five to ten years. Invention must be worked within one year from date of grant. Careful examination made before granting a patent.

HANOVER.

Duration of patent, ten years; and in case of foreign patent having been previously obtained, an authenticated copy of said patent must be produced Invention must be worked within six months from date of grant.

SARDINIA.

Duration of patent, from one to fifteen years. Patents for five years or less must be worked within one year, and all others within two years.

NORWAY AND SWEDEN.

Duration of patent, three years, at least; fifteen at most, according to the nature and importance of the invention. Patents for foreign inventions not to exceed the term granted abroad, and to be worked within one, two or four years.

AUSTRALIA.

Date of law, March 31, 1854. Careful examination made by competent persons previous to issue of patent, which, when granted, extends to fourteen years. Imported inventions are valid according to duration of foreign patent. It would require from twelve to eighteen months to procure a patent from the Australian government.

Parties holding foreign patents secured through our agency will be notified from time to time of the condition of their cases.

GENERAL REMARKS.

While it is true of most of the European countries herein specified, that the system of examination is not so rigid as that practised in this country, yet it is vastly important that inventors should have their papers prepared only by the most competent solicitors, in order that they may stand the test of a searching legal examination; as it is a common practice when a patentee finds a purchaser for his invention for the latter to cause such examination to be made before he will accept the title.

It is also very unsafe to entrust a useful invention to any other than a solicitor of known integrity and ability. Inventors should beware of speculators, whether in the guise of patent agents or patent brokers, as they cannot ordinarily be trusted with valuable inventions.

Messrs. MUNN & CO. have been established *fifteen years* as American and Foreign Patent Attorneys and publishers of the Scientific American, and during this time they have been entrusted with some of the most important inventions of the age; and it is a matter of pardonable pride in them to state that not a single case can be adduced in which they have ever betrayed the important trust committed to their care Their agents in London, Paris, and other Continental cities, are among the oldest and most reliable Patent Solicitors in Europe, and they will have no connection with any other.

Caution.—It has become a somewhat common practice for agents located in England to send out circulars soliciting the patronage of American inventors. We caution the latter against heeding such applications, or they may otherwise fall into the hands of irresponsible parties, and thus be defrauded of their rights. It is much safer for inventors to entrust their cases to the care of a competent, reliable agent at home.

Fees.—The fees required by us for the preparation of foreign applications are not the same in every case; as, in some instances, when the inventions are of a complicated character, we are obliged to charge a higher fee. Applicants can always depend, however, upon our best terms, and can learn all particulars upon application, either in person or by letter.

Parties desiring to procure patents in Europe can correspond with the undersigned, and obtain all the necessary advice and information respecting the expenses of obtaining foreign patents.

All letters should be addressed to Messrs. MUNN & CO., No. 37 Park-row, New York.

© 1861 SCIENTIFIC AMERICAN, INC.

CHANGE IN THE PATENT LAWS.

NEW ARRANGEMENTS---PATENTS GRANTED FOR SEVENTEEN YEARS.

The new Patent Laws, recently enacted by Congress, are now in full force, and promise to be of great benefit to all parties who are concerned in new inventions.

The duration of patents granted under the new act is prolonged to SEVENTEEN years, and the government fee required on filing an application for a patent is reduced from **$30** down to **$15.** Other changes the fees are also made as follows :—

On filing each Caveat	$10
On filing each application for a Patent, except for a design	$15
On issuing each original Patent	$20
On appeal to Commissioner of Patents	$20
On application for Re-issue	$30
On application for Extension of Patent	$50
On granting the Extension	$50
On filing Disclaimer	$10
On filing application for Design, three and a half years	$10
On filing application for Design, seven years	$15
On filing application for Design, fourteen years	$30

The law abolishes discrimination in fees required of foreigners, except in reference to such countries as discriminate against citizens of the United States—thus allowing English, French, Belgian, Austrian, Russian, Spanish, and all other foreigners except the Canadians, to enjoy all the privileges of our patent system (except in cases of designs) on the above terms.

During the last sixteen years, the business of procuring Patents for new inventions in the United States and all foreign countries has been conducted by Messrs. MUNN & CO., in connection with the publication of the SCIENTIFIC AMERICAN ; and as an evidence of the confidence reposed in our Agency by the Inventors throughout the country, we would state that we have acted as agents for more than FIFTEEN THOUSAND Inventors! In fact, the publishers of this paper have become identified with the whole brotherhood of Inventors and Patentees, at home and abroad. Thousands of Inventors for whom we have taken out Patents have addressed to us most flattering estimonials for the services we have rendered them, and the wealth which has inured to the Inventors whose Patents were secured through this Office, and afterward illustrated in the SCIENTIFIC AMERICAN, would amount to many millions of dollars! We would state that we never had a more efficient corps of Draughtsmen and Specification Writers than are employed at present in our extensive Offices, and we are prepared to attend to Patent business of all kinds in the quickest time and on the most liberal terms.

Testimonials.

The annexed letters, from the last three Commissioner of Patents, we commend to the perusal of all persons interested in obtaining Patents:—

Messrs. MUNN & Co.:—I take pleasure in stating that, while I held the office of Commissioner of Patents, MORE THAN ONE-FOURTH OF ALL THE BUSINESS OF THE OFFICE CAME THROUGH YOUR HANDS. I have no doubt that the public confidence thus indicated has been fully deserved, as I have always observed, in all your intercourse with the Office, a marked degree of promptness, skill and fidelity to the interests of your employers. Yours, very truly,

CHAS. MASON.

Immediately after the appointment of Mr. Holt to the office of Postmaster-General of the United States, he addressed to us the subjoined very gratifying testimonial:—

Messrs. MUNN & Co.:—It affords me much pleasure to bear testimony to the able and efficient manner in which you have discharged your duties of Solicitors of Patents while I had the honor of holding the office of Commissioner. Your business was very large, and you sustained (and, I doubt not, justly deserved) the reputation of energy, marked ability and uncompromising fidelity in performing your professional engagements. Very respectfully,

Your obedient servant, J. HOLT.

MESSRS. MUNN & Co.:—Gentleman: It gives me much pleasure to say that, during the time of my holding the office of Commissioner of Patents, a very large proportion of the business of inventors before the Patent Office was transacted through your agency, and that I have ever found you faithful and devoted to the interests of your clients, as well as eminently qualified to perform the duties of Patent Attorneys with skill and accuracy. Very respectfully,

Your obedient servant, WM. D. BISHOP.

The Examination of Inventions.

Persons having conceived an idea which they think may be patentable, are advised to make a sketch or model of their invention, and submit it to us, with a full description, for advice. The points of novelty are carefully examined, and a reply written corresponding with the facts, free of charge. Address MUNN & CO., No. 37 Park-row, New York.

Preliminary Examinations at the Patent Office.

The advice we render gratuitously upon examining an invention does not extend to a search at the Patent Office, to see if a like invention has been presented there, but is an opinion based upon what knowledge we may acquire of a similar invention from the records in our Home Office. But for a fee of $5, accompanied with a model or drawing and description, we have a special search made at the United States Patent Office, and a report setting forth the prospects of obtaining a Patent, &c., made up and mailed to the Inventor, with a pamphlet, giving instructions for further proceedings. These preliminary examinations are made through our Branch Office, corner of F and Seventh-streets, Washington, by experienced and competent persons. Over 1,500 of these examinations were made last year through this Office, and as a measure of prudence and economy, we usually advise Inventors to have a preliminary examination made. Address MUNN & CO., No. 37 Park-row, New York.

Caveats.

Persons desiring to file a Caveat can have the papers prepared in the shortest time by sending a sketch and description of the invention. The government fee for a Caveat, under the new law, is $10. A pamphlet of advice regarding applications for Patents and Caveats furnished gratis on application by mail. Address MUNN & CO., No. 37 Park-row New York.

How to Make an Application for a Patent.

Every applicant for a Patent must furnish a model of his invention, if susceptible of one; or if the invention is a chemical production, he must furnish samples of the ingredients of which his composition is composed, for the Patent Office. These should be securely packed, the Inventor's name marked on them, and sent, with the government fee, by express. The express charge should be prepaid. Small models from a distance can often be sent cheaper by mail. The safest way to remit money is by draft on New York, payable to the order of Munn & Co. Persons who live in remote parts of the country can usually purchase drafts from their merchants on their New York correspondents; but if not convenient to do so, there is but little risk in sending bank bills by mail, having the letter registered by the postmaster. Address MUNN & CO No 37 Park-row New York.

Rejected Applications.

We are prepared to undertake the investigation and prosecution of rejected cases, on reasonable terms. The close proximity of our Washington Agency to the Patent Office affords us rare opportunities for the examination and comparison of references, models, drawings, documents, &c. Our success in the prosecution of rejected cases has been very great. The principal portion of our charge is generally left dependent upon the final result.

All persons having rejected cases which they desire to have prosecuted are invited to correspond with us on the subject, giving a brief history of their case, inclosing the official letters, &c.

Foreign Patents.

We are very extensively engaged in the preparation and securing of Patents in the various European countries. For the transaction of this business, we have offices at Nos. 66 Chancery-lane, London; 29 Boulevard St. Martin, Paris; and 26 Rue des Eperonniers, Brussels. We think we can safely say that THREE-FOURTHS of all the European Patents secured to American citizens are procured through our Agency.

Inventors will do well to bear in mind that the English law does not limit the issue of Patents to Inventors. Any one can take out a Patent there.

Circulars of information concerning the proper course to be pursued in obtaining Patents in foreign countries through our Agency, the requirements of different Patent Offices, &c., may be had gratis upon application at our principal office, No. 37 Park-row, New York, or either of our Branch Offices.

Interferences.

We offer our services to examine witnesses in cases of interference, o prepare arguments, and appear before the Commissioner of Patents or in the United States Court, as counsel in conducting interferences or appeals.

For further information, send for a copy of "*Hints to Inventors.*" Furnished free. Address MUNN & CO., No. 37 Park-row, New York.

The Validity of Patents.

Persons who are about purchasing Patent property, or Patentees who are about erecting extensive works for manufacturing under their Patents, should have their claims examined carefully by competent attorneys, to see if they are not likely to infringe some existing Patent, before making large investments. Written opinions on the validity of Patents, after careful examination into the facts, can be had for a reasonable remuneration. The price for such services is always settled upon in advance, after knowing the nature of the invention and being informed of the points on which an opinion is solicited For rther particulars, address MUNN & CO., No. 37 Park-row, New York .

Extension of Patents.

Va uable Patents are annually expiring which might be extended and bring fortunes to the households of many a poor Inventor or his family. We have had much experience in procuring the extension of Patents; and, as an evidence of our success in this department, we would state that, in all our immense practice, we have lost but *two* cases, and these were unsuccessful from causes entirely beyond our control.

It is important that extension cases should be managed by attorneys of the utmost skill to insure success. All documents connected with extensions require to be carefully drawn up, as any discrepancy or untruth exhibited in the papers is very liable to defeat the application.

Of all business connected with Patents, it is most important that extensions should be intrusted only to those who have had long experience, and understand the kind of evidence to be furnished the Patent Office, and the manner of presenting it. The heirs of a deceased Patentee may apply for an extension. Parties should arrange for an application for an extension at least six months before the expiration of the Patent.

For further information as to terms and mode of procedure in obtaining an extension, address MUNN & CO., No. 37 Park-row, New York.

Assignments of Patents.

The assignment of Patents, and agreements between Patentees and manufacturers, carefully prepared and placed upon the records at the Patent Office. Address MUNN & CO., at the Scientific American Patent Agency, No. 37 Park-row, New York.

It would require many columns to detail all the ways in which the Inventor or Patentee may be served at our offices. We cordially invite all who have anything to do with Patent property or inventions to call at our extensive offices, No. 37 Park-row, New York, where any questions regarding the rights of Patentees, will be cheerfully answered.

Communications and remittances by mail, and models by express prepaid), should be addressed to MUNN & CO., No. 37 Park-row, New York.

TO OUR READERS.

Models are required to accompany applications for Patents under the new law, the same as formerly, except on Design Patents, when two good drawings are all that is required to accompany the petition, specification and oath, except the government fee.

PATENT CLAIMS.—Persons desiring the claim of any invention which has been patented within thirty years, can obtain a copy by addressing a note to this office, stating the name of the patentee and date of patent, when known, and inclosing $1 as fee for copying. We can also furnish a sketch of any patented machine issued since 1853, to accompany the claim, on receipt of $2. Address MUNN & CO., Patent Solicitors, No. 37 Park Row, New York.

BINDING.—We are prepared to bind volumes, in handsome covers, with illuminated sides, and to furnish covers for other binders. Price for binding, 50 cents. Price for covers, by mail, 50 cents ; by express or delivered at the office, 40 cents.

BACK NUMBERS AND VOLUMES OF THE SCIENTIFIC AMERICAN.—Volumes I., II. and III. (bound or unbound) may be had at this office and from all periodical dealers. Price, bound, $1.50 per volume. by mail, $2—which includes postage. Price in sheets, $1. Every mechanic, inventor or artisan in the United States should have a complete set of this publication for reference. Subscribers should not fail to preserve their numbers for binding.

NEW PAMPHLETS IN GERMAN.—We have just issued a revised edition of our pamphlet of *Instructions to Inventors*, containing a digest of the fees required under the new Patent Law, &c., printed in the German language, which persons can have gratis upon application to this office. Address MUNN & CO.,
No. 37 Park-row, New York.

RATES OF ADVERTISING.

Thirty Cents per line for each and every insertion, payable in advance. To enable all to understand how to calculate the amount they must send when they wish advertisements published, we will explain that ten words average one line. Engravings will not be admitted into our advertising columns; and, as heretofore, the publishers reserve to themselves the right to reject any advertisement sent for publication.

SWISS DRAWING INSTRUMENTS.—CATALOGUE (7TH edition), containing over 250 illustrations of Mathematical, Optical and Philosophical Instruments, with attachment of a large sheet representing the genuine Swiss Instruments, in their actual size and shape, will be delivered on application to all parts of the United States (gratis), by C. T. AMSLER, No. 635 Chestnut-street, Philadelphia, Pa., established agency for the Swiss Drawing Instruments since 1848.

Being about to retire from business, I have sold my stock of Swiss Mathematical Instruments to Messrs. McALLISTER & BROTHER, of No. 728 Chestnut street, Philadelphia, who will continue to keep such for sale, and to whom I refer my former friends and customers.

C. T. AMSLER.

Philadelphia, Pa., June 12, 1861. 1 tf

RARE CHANCE.—C. T. AMSLER, OPTICIAN, NO. 635 Chestnut-street, Philadelphia, is offering from the 1st of June his large stock of Mathematical, Optical and Philosophical Instruments at 20 per cent below the regular retail prices; Drawing Instruments and Magic Lanterns, Photograph of War Scenes, &c., are sold at the same rate. 25 4*

PORTABLE STEAM ENGINES—6, 8 AND 10-HORSE; at $500, $625 and $780. For sale by S. C. HILLS, No. 12 Platt-street, New York. 2e

IRON PLANERS, ENGINE LATHES, AND OTHER MAchinists Tools, of superior quality, on hand and finishing, and for sale low; also, Harrison's Grain Mills. For descriptive circular, address NEW HAVEN MANUFACTURING CO., New Haven, Conn. 1 26

GUILD & GARRISON'S STEAM PUMPS, FOR ALL kinds of independent steam pumping; for sale at Nos. 55 and 57 First-street, Williamsburgh, L. I., and No. 74 Beekman-street, New York. [1 26] GUILD, GARRISON & CO.

SOLID EMERY VULCANITE.—WE ARE NOW MANUfacturing wheels of this remarkable substance for cutting, grinding and polishing metals, that will outwear hundreds of the kind commonly used, and will do a much greater amount of work in the same time, and more efficiently. All interested can see them in operation at our warehouse, or circulars describing them will be furnished by mail.

NEW YORK BELTING AND PACKING CO.,
14 13 Nos. 37 and 38 Park-row, New York.

OIL! OIL! OIL!—FOR RAILROADS, STEAMERS AND for Machinery and Burning.—Pease's Improved Machinery and Burning Oil will save fifty per cent, and will not gum. This Oil possesses qualities vitally essential for lubricating and burning found in no other oil. It is offered to the public upon the most reliable, thorough and practical test. Our most skillful engineers and machinists pronounce it superior to and cheaper than any other, and the only Oil that is in all cases reliable and will not gum. The SCIENTIFIC AMERICAN, after several tests, pronounces it "superior to any other they have ever used for machinery." For sale only by the inventor and manufacturer,

F. S. PEASE,
No. 61 Main-street, Buffalo, N. Y.

N. B.—Reliable orders filled for any part of the United States and Europe. 14 13

6000 AGENTS WANTED—TO SELL SIX NEW inventions—two very recent, and of great value to families; all pay great profits to agents. Send four stamps and get 80 pages particulars. EPHRAIM BROWN, Lowell, Mass. 16 13*

PUMPS! PUMPS!! PUMPS!!!—CARY'S IMPROVED Rotary Force Pump, unrivaled for pumping hot or cold liquids. Manufactured and sold by CARY & BRAINERD, Brockport, N. Y. Also, sold by J. C. CARY, No. 2 Astor House, New York City. 14tf

MACHINE BELTING, STEAM PACKING, ENGINE HOSE.—The superiority of these articles, manufactured of vulcanized rubber, is established. Every belt will be warranted superior to leather, at one-third less price. The Steam Packing is made in every variety, and warranted to stand 300 degs. of heat. The Hose never needs oiling, and is warranted to stand any required pressure; together with all varieties of rubber adapted to mechanical purposes. Directions, prices, &c., can be obtained by mail or otherwise at our warehouse. NEW YORK BELTING AND PACKING COMPANY.

JOHN H. CHEEVER, Treasurer,
14 13 Nos. 37 and 38 Park-row, New York.

STIRLING PIG IRON.
1,000 tuns No. 1; 1,000 tuns No. 2. This iron has been used by the Federal government since its organization, and is now called for to complete the specifications just issued for the marine engines to be built for government service. For sale in lots to suit purchasers by the manufacturers only.
25 4* TOWNSEND & CO., No. 42 Pine-street, New York.

A NEW STYLE OF KNITTING MACHINE, JUST OUT for family use and manufacturing purposes ; elegantly constructed, durable, light, portable and cheap; every family should have one. For full particulars, send for an illustrated pamphlet. Address J. B. AIKEN, Franklin, N. H. Agents wanted in every State and county. 25 8

GET A PUSEY HORSE-POWER GOVERNOR AND guard against accidents. Sent by express for $6. Payable on delivery. N. B.— Rights for sale. LEA PUSEY, Wilmington, Del. 23 5*eow

WOODWORTH PLANERS—IRON FRAMES TO PLANE 18 to 24 inches wide, at $90 to $110. For sale by S. C. HILLS, No. 12 Platt-street, New York. 2 1em

A MESSIEURS LES INVENTEURS—AVIS IMPORtant. Les Inventeurs non familiers avec la langue Anglaise et qui préféreraient nous communiquer leurs inventions en Français, peuvent nous addresser dans leur langue natale. Envoyez nous un dessin et une description concise pour notre examen. Toutes communications seront reçues en confidence. MUNN & CO.,
SCIENTIFIC AMERICAN Office, No. 37 Park-row, New York.

BAR IRON AND STEEL OF ALL KINDS, SIZES AND shapes, for sale in any quantity for cash or on time. N. B.—Ulster bar iron of all sizes for machinery, &c. EGLESTON, BATTELL & CO., No. 166 South-street, New York. 14 8*eow

Zur Beachtung für deutsche Erfinder.

Die Unterzeichneten haben eine Anleitung, die Erfindern das Verhalten angibt, um sich ihre Patente zu sichern, herausgegeben, und verabfolgen solche gratis an dieselben.

Erfinder, welche nicht mit der englischen Sprache bekannt sind, können ihre Mittheilungen in der deutschen Sprache machen. Skizzen von Erfindungen mit kurzen, deutlich geschriebenen Beschreibungen beliebe man zu addressiren an

Munn & Co.,
37 Park Row, New-York.

Auf der Office wird deutsch gesprochen.

Daselbst ist zu haben :

Die Patent-Gesetze der Vereinigten Staaten,

nebst den Regeln und der Geschäftsordnung der Patent-Office und Anleitungen für den Erfinder, um sich Patente zu sichern, in den Ver. St. sowohl als in Europa. Ferner Auszüge aus den Patent-Gesetzen fremder Länder und darauf bezügliche Rathschläge; ebenfalls nützliche Winke für Erfinder und solche, welche patentiren wollen.

Preis 20 Cts., per Post 25 Cts.

© 1861 SCIENTIFIC AMERICAN, INC.

Improved Adjustable School Desk and Seat.

In order that school children may be preserved in health, and deformities in their persons avoided, it is necessary that their seats and desks should be adjusted to the several hights adapted to their statures; and this can be most readily done by so constructing the seats and desks that their hights may be varied, and thus each desk and seat fitted for the scholar that is to occupy it. Several plans have been devised for this purpose, but they have been objectionable from the want of stability, resulting from the play of the movable parts. The accompanying cut represents a seat invented by Amos Chase, of North Weare, N. H., which is provided with a brace in a way to make it remarkably firm, while it is at the same time very readily adjustable.

The seat is rigidly secured to the rod, *a*, which slides smoothly in the hollow cylinder, *b*, this cylinder being enlarged as its base and fastened firmly to the floor. The middle slat of the seat's back is lengthened downward and attached at its lower end to a projection from the rod, *a*, which passes through a vertical slit made in the cylinder, *b*, for that purpose; this slit being of sufficient length to allow the arm to slide up and down with the rise and fall of the seat. The seat is secured in any desired position by a set-screw.

The desk is also made adjustable in hight by a similar arrangement; the foot-rest being supported on an arm which is fastened to the sliding rod, and passes through a slit in the cylinder or stand.

Beside the facility of adjustment, the convenience of sweeping a room provided with these desks and seats is apparent.

This invention is secured by two patents, procured through the Scientific American Patent Agency, one dated Sept. 11, 1860, and the second June 11, 1861. Further information in relation to the matter may be obtained by addressing the assignee, N. C. Page, at North Weare, N. H.

CHASE'S SCHOOL DESK AND SEAT.

SHIELDS FOR RESISTING SHOT IN SHIPS.

The accompanying engravings represent an invention for protecting the hulls of vessels, lately patented by Mr. W. L. Thomas and Colonel de Bathe, London. The patent is for resisting projectiles, and consists in constructing what the inventors term "compound louver plates or shields," fixed at an angle with the foundation plate, the spaces between the louver plates being filled up with wood, New Zealand flax jute, or other fibrous material or compound, more or less yielding or elastic, and then cover in the whole with metal or wood.

Fig. 1 of the above engravings is a sectional elevation, illustrating one part of the invention applied to the construction of a ship's side or other structure. A A are knees or bent portion of the louver plates parallel, or nearly so, with the side of the ship. B B are the louver plates, forming part of the knees, as shown. C is the packing between the plates. F F are plates forming the outside or front. G G are screws for securing the front plates to the louver plates; or the front plates and packing may be dispensed with.

Fig. 2 is a sectional elevation of part of a ship's side or other structure, in which the foundation plate is made of zig-zag form. The louver plates are arranged with their bent ends in the reverse direction to that described above, and secured to the ship's side by bolts, having a flat portion, which is riveted to the louver plates, and a round portion passing through the foundation plate, and held by screw nuts or keys. By arranging the louver plates in this manner a flush external surface is obtained without the employment of separate outside or front plates.

Fig. 1

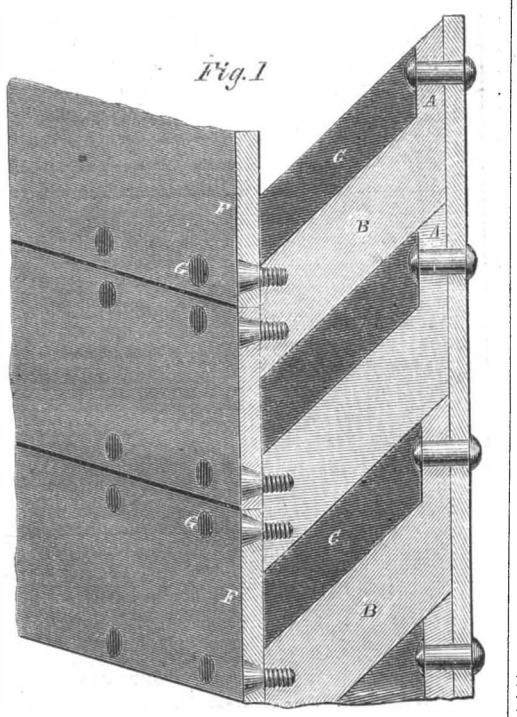
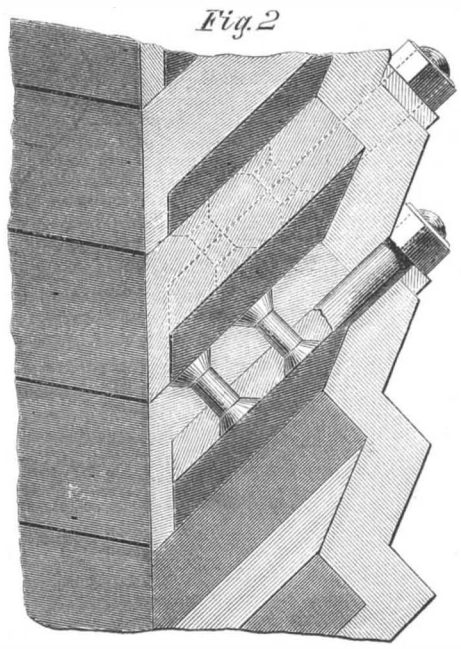


Fig. 2



This invention has been illustrated and described in the London *Mechanics' Magazine*. Our opinions hitherto have been favorable to a rigid backing, for iron plates as being the best for resisting shot, but experiment is the only way to resolve all such questions. Mr. J. Chapman, in making experiments for determining the penetration of shot, found that 18 inches of cotton, packed in a box, was more effectual in resisting the shot than as many inches of *timber*.

STATISTICS OF BRITISH TAXATION.—From 1801 till 1811 the taxation averaged £57,000,000 a year, with a population of about 17,000,000, which is about £3, 7s. per head; in 1861 the revenue, in round numbers, is about £70,000,000, and the population about 30,000,000, which makes the rate per head £2, 6s. 8d. The former was a war period doubtless; but this did not make the pressure of taxation any easier to the community. In 1801, the estimated income of the United Kingdom was £230,000,000, and the revenue was £57,000,000, or, in other words, the taxation amounted to 25 per cent of the national income. At the present time, the revenue is about £70,000,000, and the income is upwards of £600,000,000, which leaves the taxation at about 11 per cent. These figures, however, convey but a faint idea of the immense improvement which has taken place in the condition of the people within the last fifty years; food and clothing are cheaper, the wages have been nearly doubled, while taxes have been removed from the necessaries of the poor, and placed on the luxuries and the incomes of the rich.

PROSPECTUS

THE

SCIENTIFIC AMERICAN.

THE BEST MECHANICAL PAPER IN THE WORLD.

SEVENTEENTH YEAR.

VOLUME V.—NEW SERIES.

A new volume of this widely circulated paper commenced on the 6th of July. Every number contains sixteen pages of useful information, and from five to ten original engravings of new inventions and discoveries, all of which are prepared expressly for its columns.

The SCIENTIFIC AMERICAN is devoted to the interests of Popular Science, the Mechanic Arts, Manufactures, Inventions, Agriculture, Commerce and the Industrial Pursuits generally, and is valuable and instructive not only in the Workshop and Manufactory, but also in the Household, the Library and ths Reading Room.

The SCIENTIFIC AMERICAN has the reputation, at home and abroad, of being the best weekly publication devoted to mechanical and industrial pursuits now published, and the publishers are determined to keep up the reputation they have earned during the SIXTEEN YEARS they have been connected with its publication.

To the Inventor!

The SCIENTIFIC AMERICAN is indispensable to every inventor, as it not only contains illustrated descriptions of nearly all the best inventions as they come out, but each number contains an Official List of the Claims of all the Patents issued from the United States Patent Office during the week previous; thus giving a correct history of the progress of inventions in this country. We are also receiving, every week the best scientific journals of Great Britain, France, and Germany; thus placing in our possession all that is transpiring in mechanical science and art in these old countries. We shall continue to transfer to our columns copious extracts from these journals of whatever we may deem of interest to our readers.

To the Mechanic and Manufacturer!

No person engaged in any of the mechanical pursuits should think of "doing without" the SCIENTIFIC AMERICAN. It costs but four cents per week; every number contains from six to ten engravings of new machines and inventions, which cannot be found in any other publication It is an established rule of the publishers to insert none but original engravings, and those of the first-class in the art, drawn and engraved by experienced persons under their own supervision.

Chemists, Architects, Millwrights and Farmers!

The SCIENTIFIC AMERICAN will be found a most useful journa to them. All the new discoveries in the science of chemistry are given in its columns, and the interesls of the architect and carpenter are not overlooked; all the new inventions and discoveries appertaining to these pursuits being published from week to week. Useful and practical information pertaining to the interests of millwrights and millowners will be found published in the SCIENTIFIC AMERICAN which information they cannot possibly obtain from any other source. Subjects in which planters and farmers are interested will be found discussed in the SCIENTIFIC AMERICAN; most of the improvements in agrtcultural implements being illustrated in its columns.

TERMS.

To mail subscribers:—Two Dollars a Year, or One Dollar for six months. One Dollar pays for one complete volume of 416 pages; two volumes comprise one year. The volumes commence on the first of JANUARY and JULY.

CLUB RATES.

Five Copies, for Six Months	$4
Ten Copies, for Six Months	$8
Ten Copies, for Twelve Months	$15
Fifteen Copies, for Twelve Months	$22
Twenty Copies, for Twelve Months	$28

For all clubs of Twenty and over, the yearly subscription is only $1.40. Names can be sent in at different times and from different Post-offices. Specimen copies will be sent gratis to any part of the country.

Western and Canadian money or Post-office stamps taken at par for subscriptions. Canadian subscribers will please to remit 25 cents extra on each year's subscription to pre-pay postage.

MUNN & CO., Publishers,
No. 37 Park-row, New York.

FROM THE STEAM PRESS OF JOHN A. GRAY.

© 1861 SCIENTIFIC AMERICAN, INC.